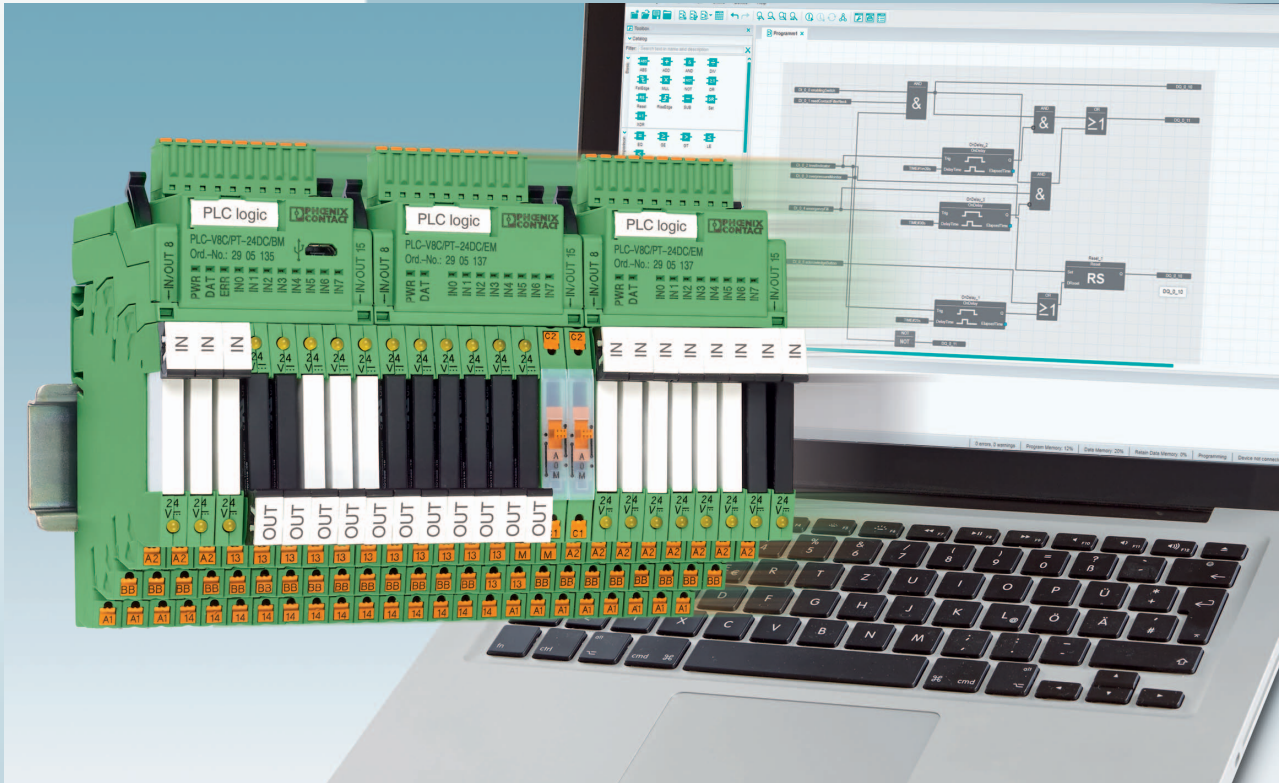




Installing and operating the PLC logic programmable logic relay system

User manual

User manual

Installing and operating the PLC logic programmable logic relay system

2014-04-03

Designation: UM EN PLC logic

Revision: 00

Order No.: —

This user manual is valid for:

Designation	Order No.
PLC-V8C/SC-24DC/BM	2903094
PLC-V8C/PT-24DC/BM	2905135
PLC-V8C/SC-24DC/EM	2903095
PLC-V8C/PT-24DC/EM	2905137
PLC-V8C/SC-24DC/SAM	2905082
PLC-V8C/PT-24DC/SAM	2905136
SW LOGIC+	

Please observe the following notes

User group of this manual

The use of products described in this manual is oriented exclusively to:

- Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
- Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

Explanation of symbols used and signal words



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.

There are three different categories of personal injury that are indicated with a signal word.

DANGER This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



This symbol together with the signal word **NOTE** and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.



This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

How to contact us

Internet

Up-to-date information on Phoenix Contact products and our Terms and Conditions can be found on the Internet at:

phoenixcontact.com

Make sure you always use the latest documentation.

It can be downloaded at:

phoenixcontact.net/products

Subsidiaries

If there are any problems that cannot be solved using the documentation, please contact your Phoenix Contact subsidiary.

Subsidiary contact information is available at phoenixcontact.com.

Published by

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg
GERMANY

Should you have any suggestions or recommendations for improvement of the contents and layout of our manuals, please send your comments to:

tecdoc@phoenixcontact.com

Please observe the following notes

General terms and conditions of use for technical documentation

Phoenix Contact reserves the right to alter, correct, and/or improve the technical documentation and the products described in the technical documentation at its own discretion and without giving prior notice, insofar as this is reasonable for the user. The same applies to any technical changes that serve the purpose of technical progress.

The receipt of technical documentation (in particular user documentation) does not constitute any further duty on the part of Phoenix Contact to furnish information on modifications to products and/or technical documentation. You are responsible to verify the suitability and intended use of the products in your specific application, in particular with regard to observing the applicable standards and regulations. All information made available in the technical data is supplied without any accompanying guarantee, whether expressly mentioned, implied or tacitly assumed.

In general, the provisions of the current standard Terms and Conditions of Phoenix Contact apply exclusively, in particular as concerns any warranty liability.

This manual, including all illustrations contained herein, is copyright protected. Any changes to the contents or the publication of extracts of this document is prohibited.

Phoenix Contact reserves the right to register its own intellectual property rights for the product identifications of Phoenix Contact products that are used here. Registration of such intellectual property rights by third parties is prohibited.

Other product identifications may be afforded legal protection, even where they may not be indicated as such.

Table of contents

1	Overview of PLC logic	9
1.1	Quick finder	9
1.2	What is PLC logic?	9
1.3	How does PLC logic work?	10
1.4	What can PLC logic be used for?	11
2	Hardware description	13
2.1	Hardware configuration examples	16
2.1.1	10 inputs, 6 outputs	16
2.1.2	8 inputs, 8 outputs	17
2.1.3	20 inputs, 12 outputs	18
3	Installing PLC logic	19
3.1	Connection and operating elements	20
3.1.1	Stand-alone logic modules	20
3.1.2	Basic logic modules	21
3.1.3	Extension logic modules	22
3.1.4	PLC-INTERFACE terminal blocks	23
3.2	Diagnostics and status indicators	24
3.3	Circuit diagrams	26
3.4	Mounting and removing PLC logic	28
3.4.1	Safety notes	28
3.4.2	Mounting stand-alone and basic modules	28
3.4.3	Optional mounting of extension modules	30
3.4.4	Removal	31
4	Connecting and wiring PLC logic	33
4.1	Power supply	33
4.2	Inputs and outputs	34
4.2.1	Integrated inputs	34
4.2.2	Inputs and outputs via PLC-INTERFACE terminal blocks	36
4.3	Micro USB connection	44
5	Startup	45
5.1	LOGIC+ software installation	45
5.2	Connection to the PC	45
5.3	Configuration via web server	46
5.3.1	Monitoring, Diagnose	46
5.3.2	Login	48
5.3.3	Configuration	49
5.3.4	Administration	51

5.4	Programming with LOGIC+.....	57
5.4.1	System requirements	57
5.4.2	Starting LOGIC+	58
5.4.3	Hardware configuration	62
5.4.4	Function blocks	63
5.4.5	Data item types in LOGIC+	64
5.4.6	Connecting the device to LOGIC+	65
5.4.7	Executing a project on PLC logic	66
5.4.8	Memory and size of a program	67
5.4.9	Cycle time	68
5.5	IFS-CONFSTICK (memory).....	69
5.5.1	Writing the device configuration and program to the IFS-CONFSTICK	69
5.5.2	Running the device configuration and program on the logic module	70
5.6	Integration in PROFIBUS DP	70
5.6.1	Mounting	71
5.6.2	EM-PB-GATEWAY-IFS gateway	72
5.6.3	Block diagram	73
5.6.4	Status LEDs	73
5.6.5	Communication with PLC logic	75
6	Function examples	87
6.1	Analog differential threshold value switch.....	87
6.2	Analog threshold value switch	88
6.3	Analog comparator	88
6.4	Pulse relay.....	89
6.5	Interval time-delay relay with pulse output	89
6.6	Edge-triggered interval time-delay relay	90
7	Application examples	91
7.1	Underground parking garage ventilation.....	91
7.1.1	Hardware structure	92
7.1.2	LOGIC+ program	93
7.1.3	Inputs and outputs used	93
7.2	Sliding door system	94
7.2.1	Hardware structure	95
7.2.2	LOGIC+ program	96
7.2.3	Inputs and outputs used	97
7.3	Temperature monitoring with adjustable switching hysteresis	99
7.3.1	Hardware structure	99
7.3.2	LOGIC+ program	100
7.3.3	Inputs and outputs used	100

7.4	Conveyor belt system	101
7.4.1	Hardware structure	101
7.4.2	LOGIC+ program	102
7.4.3	Inputs and outputs used	102
A	Technical data	103
B	Appendix for document lists.....	105
B 1	List of figures	105
B 2	List of tables	109

1 Overview of PLC logic

1.1 Quick finder

Here you will find an overview of frequently used information regarding your PLC logic relay system.

Table 1-1 Frequently used information

Password	Default password: admin (see "Login" on page 48)
Call the web server	Connect the device and enter either of the following addresses in a standard browser: http://v8c_usb or 169.254.200.9
Set the time	Connect the device and access the device via the web server, "Configuration > Global" menu item (see "Global" on page 49)
Analog values (see "Integrated inputs" on page 34)	The analog inputs at IN6 and IN7 process 0 V ... 10 V input signals. Value range in LOGIC+: 0...1000
Installation of the PLC logic communication driver for the PC	For details regarding installation, see "Connection to the PC" on page 45

1.2 What is PLC logic?

The PLC logic programmable logic relay system consists of PLC-V8C logic modules, relays or solid-state relays from the PLC-INTERFACE series, and the LOGIC+ programming software.

The PLC-V8C logic modules together with the narrow 6.2 mm PLC-INTERFACE modules form a microcontroller which performs small automation tasks and replaces conventional switching and control devices, all without any extensive programming knowledge being required.

1.3 How does PLC logic work?

With eight fixed inputs and a further eight freely configurable I/O channels with relays or solid-state relays from the PLC-INTERFACE series, the system has a modular design and can process a maximum of 48 I/O signals with two PLC-V8C extension modules. Each of the freely configurable I/O channels can be configured as an input or output.

PLC logic is configured and programmed using the "LOGIC+" software. The software can be downloaded free of charge at phoenixcontact.net/products.

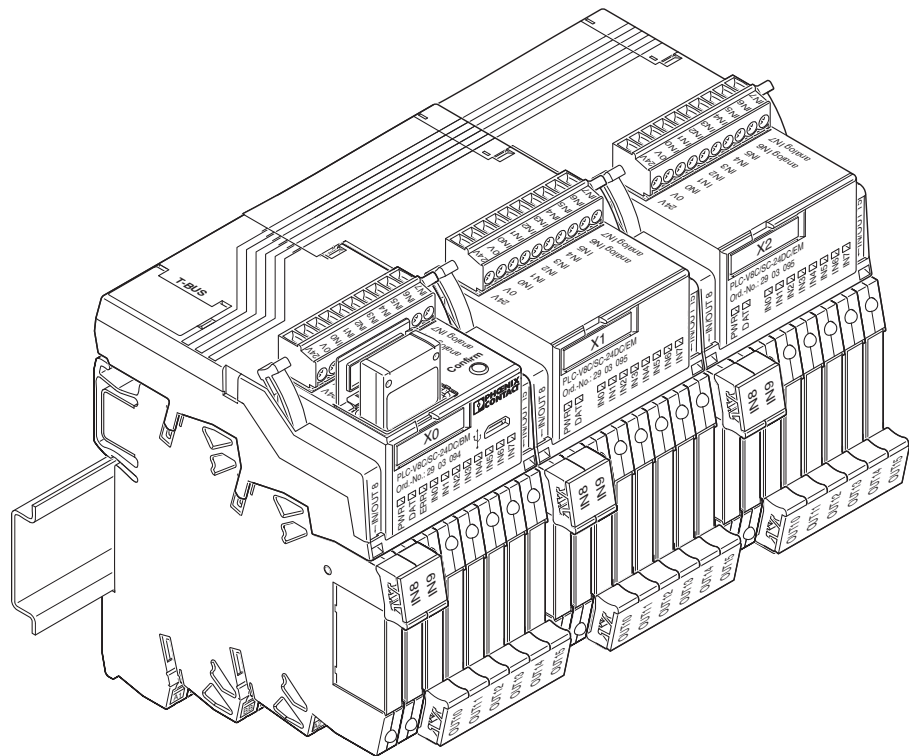


Figure 1-1 Entire system

1.4 What can PLC logic be used for?

PLC logic handles tasks in industrial, system, and installation technology as well as laboratory and training applications. Typical applications are listed in the table below.

Table 1-2 Possible applications

Application	Example
Applications with time functions	Switch-on/switch-off delay, weekly timer, pulse stretching, flashing relay
Small machines	Drives, pumps, valves, compressors, exhaust and filter systems, mixing machines, dosing machines
Handling equipment	Conveyors, lifting tables, freight elevators, silos, feeding systems
Heating, ventilation, air conditioning	Fans, cooling, heating, air conditioning systems
Building automation	Doors, barriers, shutters and blinds, sprinklers, lighting control systems
Other applications	Signaling systems (e.g., construction sites), alarm systems

2 Hardware description

The PLC-V8C logic modules are inserted in the bridge shafts of eight PLC-INTERFACE modules mounted side by side on a DIN rail. All logic modules feature the following:

- Eight integrated digital inputs: two of which can be configured as analog inputs
- Connection via connector with screw or push-in connection technology
- A further eight channels can be configured with corresponding PLC-INTERFACE terminal blocks as digital inputs or outputs
- Programming possible using the LOGIC+ software

The following PLC-V8C types are available:

PLC-V8C stand-alone modules

Order No.	Designation
2905082	PLC-V8C/SC-24DC/SAM with screw connection
2905136	PLC-V8C/PT-24DC/SAM with push-in connection

- Basic logic module with 16 I/Os, cannot be extended
- Connection to PC via micro USB socket
- Integrated realtime clock
- Accommodates external IFS-CONFSTICK memory module

PLC-V8C basic modules

Order No.	Designation
2903094	PLC-V8C/SC-24DC/BM with screw connection
2905135	PLC-V8C/PT-24DC/BM with push-in connection

- Basic logic module with 16 I/Os, can be extended with a maximum of two extension modules (PLC-V8C.../EM) to 48 I/Os
- Connection to PC via micro USB socket
- Integrated realtime clock
- Accommodates external IFS-CONFSTICK memory module
- Optional connection to PROFIBUS-GATEWAY-IFS

PLC-V8C extension modules

Order No.	Designation
2903095	PLC-V8C/SC-24DC/EM with screw connection
2905137	PLC-V8C/PT-24DC/EM with push-in connection

Extension logic module with 16 I/Os, for extending the basic module

The following PLC-INTERFACE modules can be connected to PLC-V8C.

Each channel can be configured as an input or output using the LOGIC+ software.

Table 2-1 Corresponding PLC-INTERFACE terminal blocks

Type	Order designation	Order No.	Order designation	Order No.
	Push-in connection		Screw connection	
Relay output				
1 PDT, output data 6 A, 250 V AC/DC	PLC-RPT-24DC/21	2900299	PLC-RSC-24DC/21	2966171
1 PDT, output data 50 mA, 36 V DC, gold contact	PLC-RPT-24DC/21AU	2900306	PLC-RSC-24DC/21AU	2966265
1 N/O contact, output data 6 A, 250 V AC/DC, actuator type	PLC-RPT-24DC/1/ACT	2900312	PLC-RSC-24DC/1/ACT	2966210
1 N/O contact with switch, output data 6 A, 250 V AC/DC	PLC-RPT-24UC/1/S/H	2900328	PLC-RSC-24UC/1/S/H	2982236
Solid-state relay output				
Output data 100 mA, 3 V DC ... 48 V DC	PLC-OPT-24DC/48DC/100	2900352	PLC-OSC-24DC/48DC/100	2966728
Output data 3 A, 3 V DC ... 33 V DC	PLC-OPT-24DC/24DC/2	2900364	PLC-OSC-24DC/24DC/2	2966634
Output data 750 mA, 24 V AC ... 253 V AC	PLC-OPT-24DC/230AC/1	2900369	PLC-OSC-24DC/230AC/1	2967840
Output data 3 A, 3 V DC ... 33 V DC, actuator type	PLC-OPT-24DC/24DC/2/ACT	2900376	PLC-OSC-24DC/24DC/2/ACT	2966676
Output data 750 mA, 24 V AC ... 253 V AC, actuator type	-	-	PLC-OSC-24DC/230AC/1/ACT	2967947
Output data 1 A, 12 V DC ... 300 V DC	PLC-OPT-24DC/300DC/1	2900383	PLC-OSC-24DC/300DC/1	2980678
Output data 10 A, 3 V DC ... 33 V DC	PLC-OPT-24DC/24DC/10/R	2900398	PLC-OSC-24DC/24DC/10/R	2982702
Output data 500 mA, 3 V DC ... 48 V DC, electronic PDT	PLC-OPT-24DC/48DC/500/W	2900378	PLC-OSC-24DC/48DC/500/W	2980636
Output data, TTL, 50 mA, 5 V DC	PLC-OPT-24DC/TTL	2900363	PLC-OSC-24DC/TTL	2982728
Relay input				
Input voltage 24 V DC	PLC-RPT-24DC/1AU/SEN	2900313	PLC-RSC-24DC/1AU/SEN	2966317
Input voltage 120 V AC/DC	PLC-RPT-120UC/1AU/SEN	2900314	PLC-RSC-120UC/1AU/SEN	2966320
Input voltage 230 V AC/DC	PLC-RPT-230UC/1AU/SEN	2900315	PLC-RSC-230UC/1AU/SEN	2966333
Input voltage 5 V DC (basic terminal block without relay)	PLC-BSC-5DC/1/SEN	2980267	-	-
Relay for 5 V DC basic terminal block	REL-MR-4,5DC/21AU	2961370	-	-

Table 2-1 Corresponding PLC-INTERFACE terminal blocks [...]

Type	Order designation	Order No.	Order designation	Order No.
	Push-in connection		Screw connection	
Solid-state relay input				
Input voltage 24 V DC	PLC-OPT- 24DC/48DC/100/V8C/ SEN	2904693	PLC-OSC- 24DC/48DC/100/V8C/S EN	2904690
Input voltage 120 V AC/DC	PLC-OPT- 120UC/48DC/100/V8C/ SEN	2904694	PLC-OSC- 120UC/48DC/100/V8C/ SEN	2904691
Input voltage 230 V AC/DC	PLC-OPT- 230UC/48DC/100/V8C/ SEN	2904695	PLC-OSC- 230UC/48DC/100/V8C/ SEN	2904692
Dummy or reserve				
Basic terminal blocks output	PLC-BPT-24DC/21	2900445	PLC-BSC-24DC/21	2966016
Basic terminal blocks input	PLC-BPT-24DC/1/SEN	2900262	PLC-BSC-24DC/1/SEN	2966061

2.1 Hardware configuration examples

2.1.1 10 inputs, 6 outputs

Inputs	24 V DC via eight integrated inputs and two PLC-INTER-FACE inputs via relays
Outputs	Via six PLC-INTERFACE relays, 1 N/O contact, 250 V AC/6 A
Connection technology	Screw connection
Required components	1 x PLC-V8C/SC-24DC/SAM (Order No. 2905082) 2 x PLC-RSC-24DC/1AU/SEN (Order No. 2966317) 6 x PLC-RSC-24DC/1/ACT (Order No. 2966210)

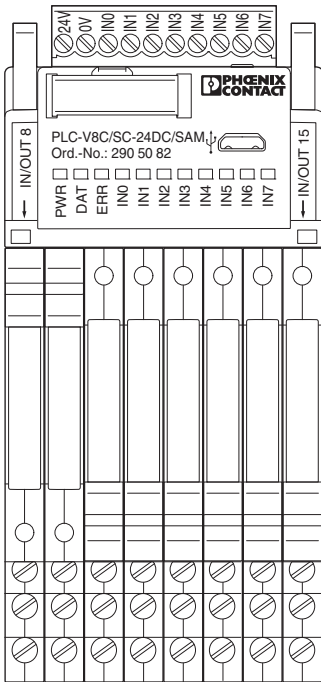


Figure 2-1 Configuration with 10 inputs, 6 outputs

2.1.2 8 inputs, 8 outputs

Inputs	All 24 V DC inputs via eight integrated inputs
Outputs	All outputs via PLC-INTERFACE relays, 1 PDT, 250 V AC/6 A
Connection technology	Screw connection
Required components	1 x PLC-V8C/SC-24DC/SAM (Order No. 2905082) 8 x PLC-RSC-24DC/21 (Order No. 2966171)

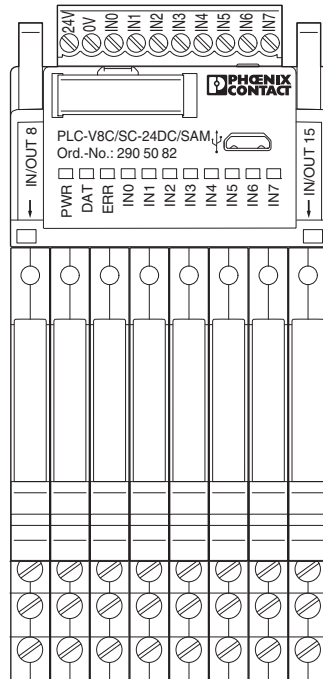


Figure 2-2 Configuration with 8 inputs, 8 outputs

2.1.3 20 inputs, 12 outputs

Inputs	16 24 V DC inputs via 2 x eight integrated inputs and four 230 V AC inputs via PLC-INTERFACE relays
Outputs	12 outputs via PLC-INTERFACE solid-state relays, 230 V AC/750 mA
Connection technology	Screw connection
Required components	1 x PLC-V8C/SC-24DC/BM (Order No. 2903094) 1 x PLC-V8C/SC-24DC/EM (Order No. 2903095) 4 x PLC-RSC/230UC/1AU/SEN (Order No. 2966333) 12 x PLC-OSC-24DC/230AC/1/ACT (Order No. 2967947)

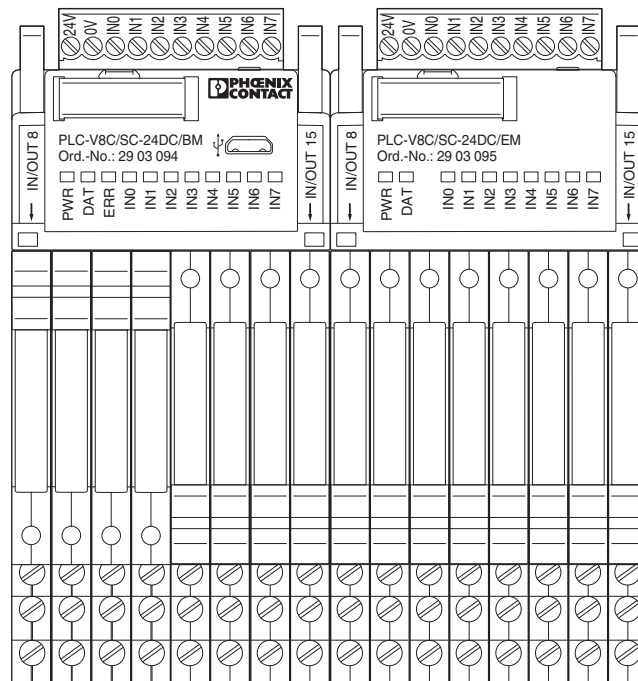


Figure 2-3 Configuration with 20 inputs, 12 outputs

3 Installing PLC logic

The logic module is supplied together with a package slip with installation instructions. Read the complete package slip carefully before unpacking the logic module.

**NOTE: Electrostatic discharge**

The logic module contains components that can be damaged or destroyed by electrostatic discharge. When handling the logic module, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.

**NOTE: Risk of damage to equipment**

To avoid possible damage to the logic module, unpack and pack the logic module in accordance with the ESD regulations.

3.1 Connection and operating elements

3.1.1 Stand-alone logic modules

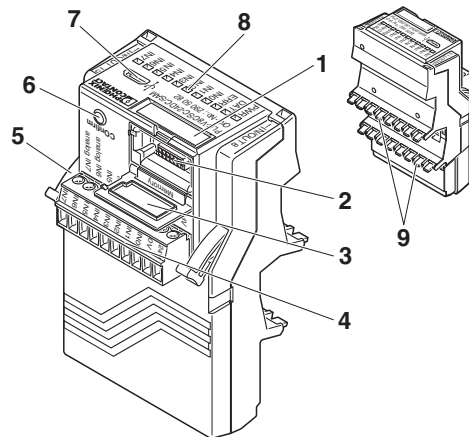


Figure 3-1 Connection and operating elements of stand-alone logic modules

1. Device marking label
2. Memory socket
3. Memory cover
4. 10-pos. COMBICON plug
5. Eject lever
6. Confirmation button (Confirm)
7. Micro USB socket
8. Status LEDs
9. Contacts for PLC-INTERFACE terminal blocks

3.1.2 Basic logic modules

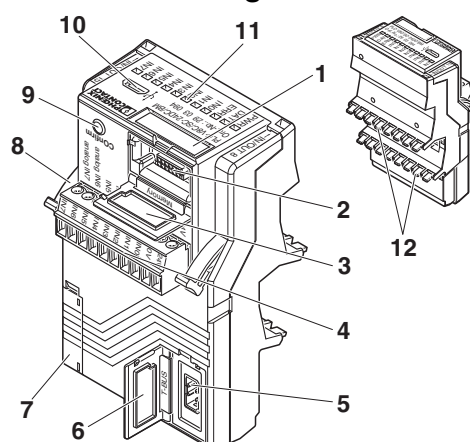


Figure 3-2 Connection and operating elements of basic logic modules

1. Device marking label
2. Memory socket
3. Memory cover
4. 10-pos. COMBICON plug
5. DIN rail connector connection
6. DIN rail connector cover
7. Covering hood/socket contacts for extension module
8. Eject lever
9. Confirmation button (Confirm)
10. Micro USB socket
11. Status LEDs
12. Contacts for PLC-INTERFACE terminal blocks

3.1.3 Extension logic modules

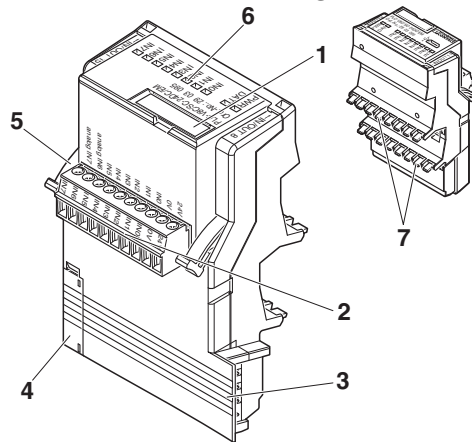


Figure 3-3 Connection and operating elements of extension logic modules

1. Device marking label
2. 10-pos. COMBICON plug
3. Knife contacts of extension modules
4. Covering hood/socket contacts for extension module
5. Eject lever
6. Status LEDs
7. Contacts for PLC-INTERFACE terminal blocks

3.1.4 PLC-INTERFACE terminal blocks

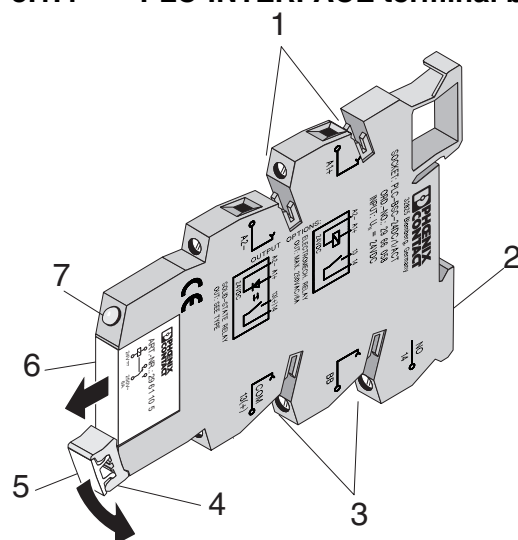


Figure 3-4 Connection and operating elements of PLC-INTERFACE terminal blocks

1. Contacts to accommodate the logic module
2. PLC-B... basic terminal block
3. Contact for jumper system
4. Snap-in lever for securing and ejecting the function electronics
5. Optional ZB6 device marking label
6. Plug-in function electronics
7. LED status indicator

3.2 Diagnostics and status indicators

The device is equipped with 11 LED status or diagnostics indicators, from which the operating state can be read.

Table 3-1 Diagnostics and status indicators

	Basic module				Extension module		
	Green PWR LED	Green DAT LED	Red ERR LED	Yellow YE LED	Green PWR LED	Green DAT LED	Yellow YE LED
Messages							
Supply voltage not present	●	●	●	●	●	●	●
Supply voltage OK; program running; no data traffic to the extension module	☀	●	●	●	☀	●	●
Supply voltage OK; program running; data traffic to the extension module	☀	●	●	●	☀	☀	●
Supply voltage OK; controller in stop mode	☀/● Fast	●	☀/● Fast	●	☀	●	●
Supply voltage OK; connection to the extension module interrupted	☀/● Fast	●	☀/●	●	●	●	●
Supply voltage OK; firmware update of basic module running	☀	☀/●	●	●	☀	●	●
Supply voltage OK; firmware update of extension module running	☀	●	●	●	☀	☀/●	●
Supply voltage OK; internal error at basic module	☀	●	☀	●	☀	●	●
Supply voltage OK; external error	☀	●	☀/●	●	☀	●	●
Supply voltage OK; short circuit at PLC outputs or overload error at basic or extension module	☀	●	☀/●	●	☀	●	●
Digital inputs							
Supply voltage OK; input at basic module, extension module controlled	☀	●	●	☀	☀	●	☀
Supply voltage OK; input at basic module, extension module not controlled	☀	●	●	●	☀	●	●
Memory stick							
Supply voltage OK; copying new program to the memory stick	☀	☀/●	●	●	☀	●	●
Supply voltage OK; finished copying	☀	●	●	●	☀	●	●
Supply voltage OK; new program on the memory stick	☀	☀/●	☀/●	●	☀	●	●

Table 3-1 Diagnostics and status indicators [...]

	Basic module				Extension module		
	Green PWR LED	Green DAT LED	Red ERR LED	Yellow YE LED	Green PWR LED	Green DAT LED	Yellow YE LED
Supply voltage OK; error when handling the memory stick			 Fast				
IFS gateway							
Supply voltage OK; data traffic to the IFS gateway							
Supply voltage OK; data traffic to the IFS gateway; data traffic to the extension module							
Supply voltage OK; no data traffic to the IFS gateway; no data traffic to the extension module	 Fast						
Supply voltage OK; data traffic to the IFS gateway; connection to the extension module interrupted	 Fast						
Supply voltage OK; data traffic to the IFS gateway; controller in stop mode	 Fast		 Fast				

Table 3-2 Explanation of symbols

Symbol	Description
	LED is off
	LED is on
	LED is flashing
 Fast	LED is flashing quickly

3.3 Circuit diagrams

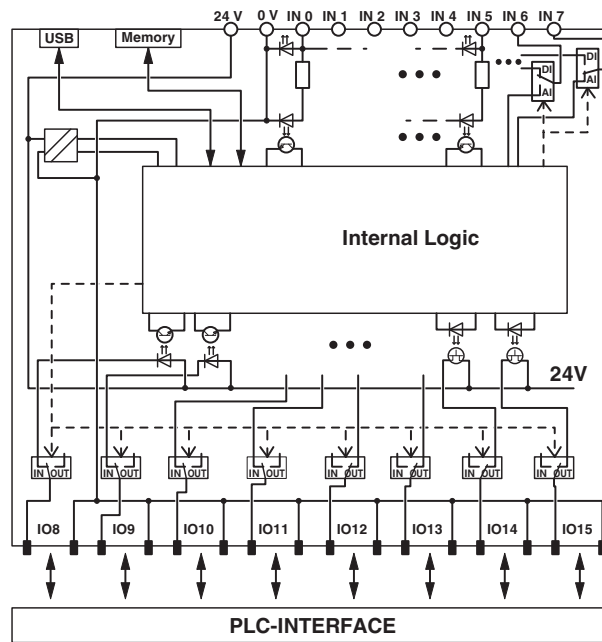


Figure 3-5 Basic circuit diagram for PLC-V8C/.../SAM

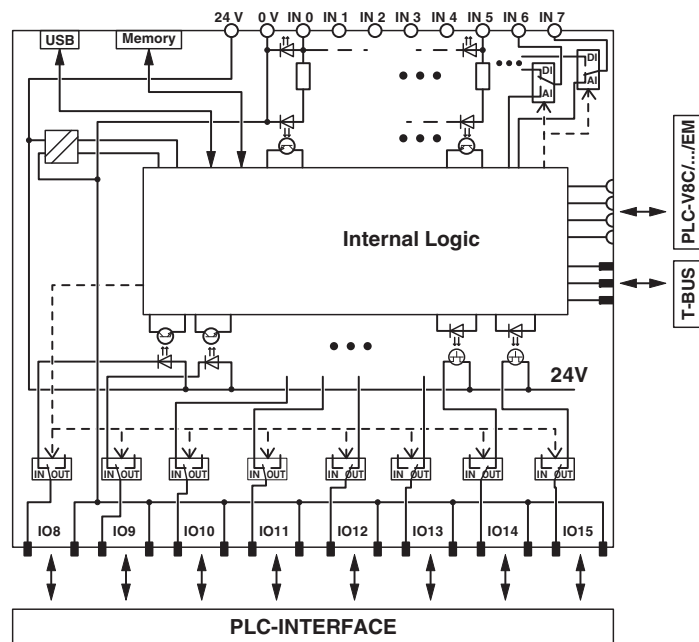


Figure 3-6 Basic circuit diagram for PLC-V8C/.../BM

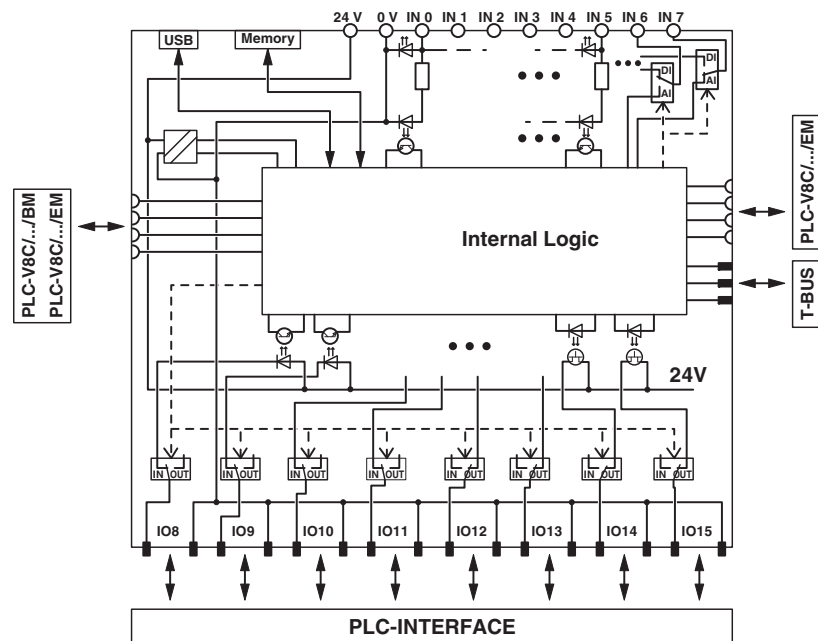


Figure 3-7 Basic circuit diagram for PLC-V8C/.../EM

3.4 Mounting and removing PLC logic

3.4.1 Safety notes

Position an end bracket at the start and end of a PLC logic structure (recommendation: CLIPFIX 35-5; Order No. 3022276). If subject to vibration, the DIN rail needs to be fixed at intervals of 10 cm.

3.4.2 Mounting stand-alone and basic modules

Proceed as follows to mount PLC logic:

1. Snap the eight corresponding PLC-INTERFACE terminal blocks (see Table 2-1 on page 14) side by side onto the DIN rail.

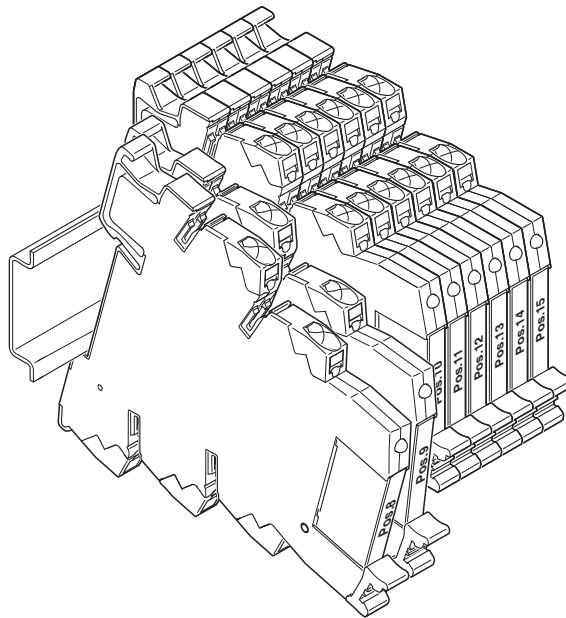


Figure 3-8 Snapping the PLC-INTERFACE terminal blocks onto the DIN rail

2. Insert the logic module (stand-alone or basic module) into the corresponding contacts of the eight PLC-INTERFACE terminal blocks. In general, the logic module is inserted in the contact locators of the PLC-INTERFACE terminal blocks, which also have a foot lever for the terminal block located on the side (item 1 Figure 3-4 on page 23).

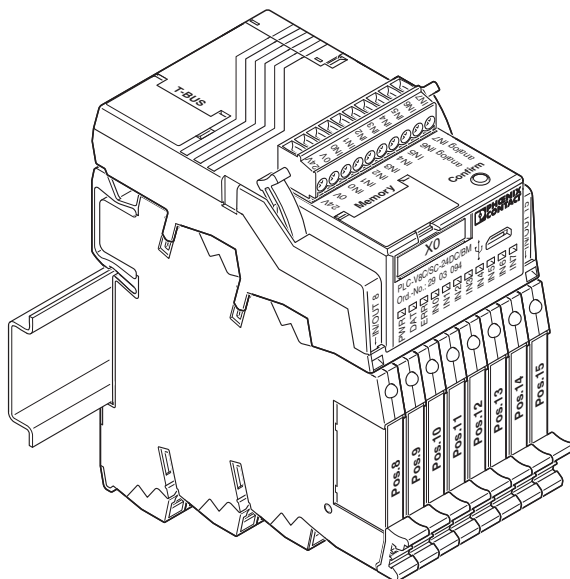


Figure 3-9 Snapping the logic module onto the PLC-INTERFACE terminal blocks

3. Make sure that the logic module is flush with the PLC-INTERFACE terminal blocks. It can then be fixed in place correctly.

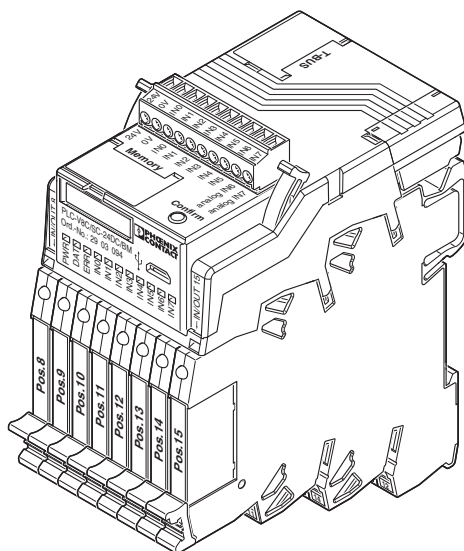
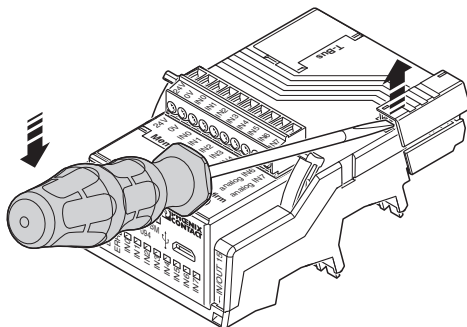


Figure 3-10 Logic module is fixed in place

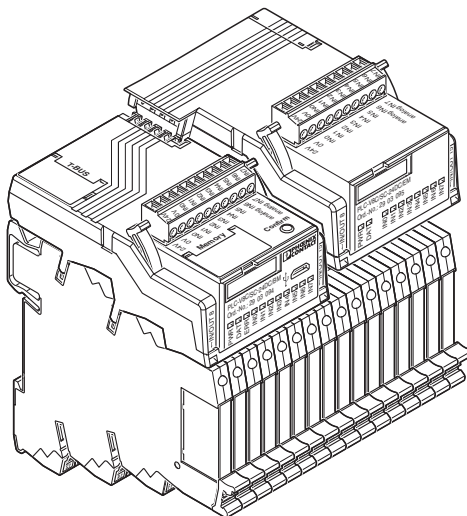
3.4.3 Optional mounting of extension modules

If you require more I/O signals than are supported with the PLC-V8C...BM basic module, connect a maximum of two PLC-V8C...EM extension modules to the basic module.

1. Remove the covering hood (7) from the basic module (see Figure 3-2 on page 21).



2. Connect a further eight PLC-INTERFACE terminal blocks to the last PLC-INTERFACE terminal block of the basic module.
3. Insert the extension module in the bridge shafts of the PLC-INTERFACE terminal blocks. Contact is automatically established with the basic module via the plug-in connection (7) and (13) (see Figure 3-2 on page 21).



4. Proceed in the same way to attach a second extension module. To do this, remove the covering hood (7) on the first extension module (see Figure 3-3 on page 22).

3.4.4 Removal

The logic module is disconnected from the PLC-INTERFACE terminal blocks by simultaneously actuating both eject levers. Proceed as follows:

First remove the last extension module, followed by the first extension module and then the basic module.

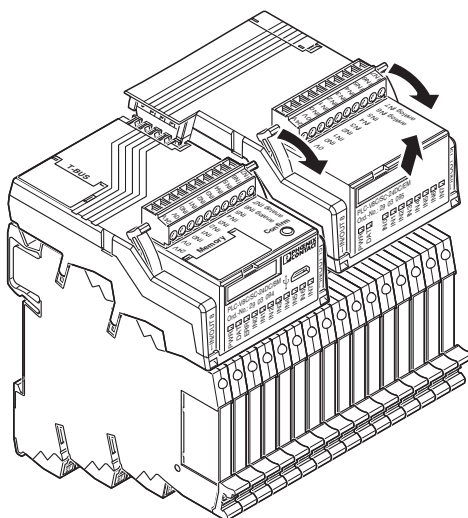


Figure 3-11 Actuating the eject levers to remove the logic modules

4 Connecting and wiring PLC logic

4.1 Power supply

The logic modules are supplied with voltage via the 10-pos. COMBICON connector. Optional extension modules must be supplied separately.

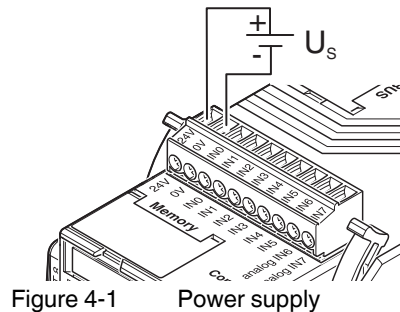


Figure 4-1 Power supply

Table 4-1 Connection data for the 10-pos. COMBICON connector

Plug type	Screw connection
Conductor cross section (solid/stranded)	0.14 - 1.5 mm ² /0.14 - 1.5 mm ² /28 - 16 AWG
Stripping length	7 mm
Tightening torque	0.22 - 0.25 Nm
Connector plug that can be ordered as replacement part	MC 1,5/10-ST-3,5 (unprinted) (Order No. 1840447)
Plug type	Push-in connection
Conductor cross section (solid/stranded)	0.14 - 1.5 mm ² /0.14 - 1.5 mm ² /28 - 16 AWG
Stripping length	9 mm
Connector plug that can be ordered as replacement part	FK-MCP 1,5/10-ST-3,5 (unprinted) (Order No. 1939989)

4.2 Inputs and outputs

4.2.1 Integrated inputs

Like the power supply, the eight integrated inputs (IN0 to IN7) are connected via the 10-pos. COMBICON connector (for connection data, see Table 4-1 on page 33).

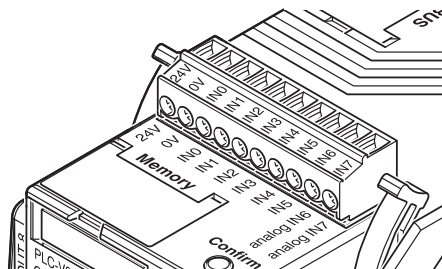


Figure 4-2 Integrated inputs

Table 4-2 Properties of the integrated inputs

Status	IN0 to IN5	IN6, IN7
Off	< 5 V DC	< 5 V DC
Input current	< 0.9 mA	< 1 mA
On	> 11 V DC	> 11 V DC
Input current	> 2.2 mA	> 2.3 mA

When the status changes from Off to On, the voltage must be > 11 V DC for at least one program cycle so that the logic module detects the new status. The same applies when the status changes from On to Off. In this case the voltage must be < 5 V DC for at least one program cycle so that the new status is detected.

For information on the cycle time, see “Cycle time” on page 68.

Inputs IN6 and IN7 can be used as digital inputs or as analog inputs (0 V DC ... 10 V DC voltage inputs). Configuration is carried out in the LOGIC+ software.

4.2.1.1 Connecting integrated inputs

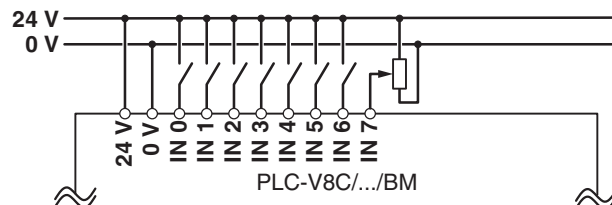


Figure 4-3 Connecting integrated inputs

The integrated inputs are non-isolated, i.e., they have the same ground as the supply voltage. For floating entries, the inputs are available via PLC-INTERFACE terminal blocks (POS.8 to POS.15).

4.2.1.2 Designation of the inputs

Table 4-3 Stand-alone logic module and basic logic module (station 0)

Plug designation	ID in LOGIC+
IN0	DI_0_0
IN1	DI_0_1
IN2	DI_0_2
IN3	DI_0_3
IN4	DI_0_4
IN5	DI_0_5
IN6	DI_0_6 (digital), AI_0_6 (analog)
IN7	DI_0_7 (digital), AI_0_7 (analog)

Table 4-4 First extension logic module (station 1)

Plug designation	ID in LOGIC+
IN0	DI_1_0
IN1	DI_1_1
IN2	DI_1_2
IN3	DI_1_3
IN4	DI_1_4
IN5	DI_1_5
IN6	DI_1_6 (digital), AI_1_6 (analog)
IN7	DI_1_7 (digital), AI_1_7 (analog)

Table 4-5 Second extension logic module (station 2)

Plug designation	ID in LOGIC+
IN0	DI_2_0
IN1	DI_2_1
IN2	DI_2_2
IN3	DI_2_3
IN4	DI_2_4
IN5	DI_2_5
IN6	DI_2_6 (digital), AI_2_6 (analog)
IN7	DI_2_7 (digital), AI_2_7 (analog)

4.2.2 Inputs and outputs via PLC-INTERFACE terminal blocks

The PLC-V8C logic modules are inserted in the bridge shafts of eight PLC-INTERFACE terminal blocks mounted side by side on a DIN rail. These eight PLC-INTERFACE terminal blocks form the inputs or outputs at positions Pos.8 to Pos.15. The relevant position is set as an input or output in the LOGIC+ software (see "Hardware configuration" on page 62). Once this is specified, the corresponding PLC-INTERFACE terminal block can be used at the relevant position. Use basic terminal blocks for channels that are not required in order to ensure sufficient mechanical stability. For a list of corresponding PLC-INTERFACE terminal blocks, refer to Table 2-1 on page 14.



NOTE: Risk of short circuit

When wiring a mixture of inputs/outputs via PLC-INTERFACE in the field, observe the different potentials on the same connection levels.

Terminal points BB, 13, and A2 have different potentials with output and input relays (see Figure 4-8 on page 40 and Figure 4-11 on page 43). Make sure that a short circuit does not occur when using FBST jumpers. The following 2-pos. jumpers are recommended for bridging the same potential and for the clear delimitation of different potentials.

Table 4-6 Recommended jumpers

Color	Order designation	Order No.
Red	FBST 6-PLC RD	2966236
Blue	FBST 6-PLC BU	2966182
Gray	FBST 6-PLC GY	2966825

4.2.2.1 Designation of inputs and outputs via PLC-INTERFACE terminal blocks

In the LOGIC+ software, inputs have the designation DI_X_X and outputs have the designation DQ_X_X.

Table 4-7 Stand-alone logic module and basic logic module (station 0)

Slot	ID in LOGIC+
POS.8	DI_0_8 or DQ_0_8
POS.9	DI_0_9 or DQ_0_9
POS.10	DI_0_10 or DQ_0_10
POS.11	DI_0_11 or DQ_0_11
POS.12	DI_0_12 or DQ_0_12
POS.13	DI_0_13 or DQ_0_13
POS.14	DI_0_14 or DQ_0_14
POS.15	DI_0_15 or DQ_0_15

Table 4-8 First extension logic module (station 1)

Slot	ID in LOGIC+
POS.8	DI_1_8 or DQ_1_8
POS.9	DI_1_9 or DQ_1_9
POS.10	DI_1_10 or DQ_1_10
POS.11	DI_1_11 or DQ_1_11
POS.12	DI_1_12 or DQ_1_12
POS.13	DI_1_13 or DQ_1_13
POS.14	DI_1_14 or DQ_1_14
POS.15	DI_1_15 or DQ_1_15

Table 4-9 Second extension logic module (station 2)

Slot	ID in LOGIC+
POS.8	DI_2_8 or DQ_2_8
POS.9	DI_2_9 or DQ_2_9
POS.10	DI_2_10 or DQ_2_10
POS.11	DI_2_11 or DQ_2_11
POS.12	DI_2_12 or DQ_2_12
POS.13	DI_2_13 or DQ_2_13
POS.14	DI_2_14 or DQ_2_14
POS.15	DI_2_15 or DQ_2_15

4.2.2.2 Connection technology of PLC-INTERFACE terminal blocks

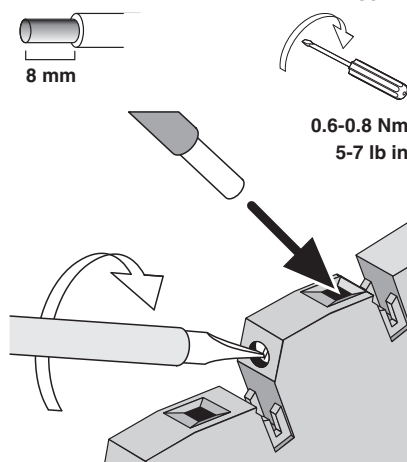


Figure 4-4 PLC modules with screw connection

Conductor cross section (solid/stranded): 0.14 - 2.5 mm²/0.14 - 2.5 mm²/26 - 14 AWG

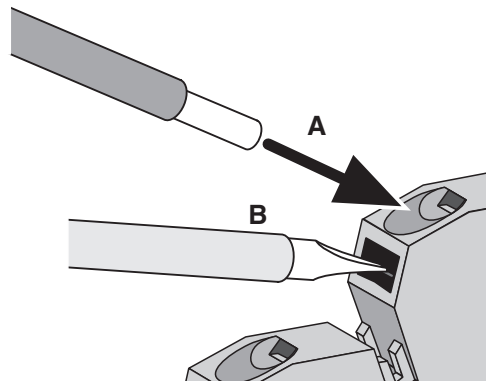


Figure 4-5 PLC modules with push-in connection

Conductor cross section (solid/stranded): 0.14 - 2.5 mm²/0.14 - 2.5 mm²/26 - 14 AWG

Stripping length: 8 mm

Insert solid or stranded conductors with ferrules and a cross section $\geq 0.34 \text{ mm}^2$ directly in the clamping space (A). Reliable contact can be made with stranded conductors without ferrules by opening the spring beforehand using the pushbutton (B). Press the pushbutton (B) also to release the conductor.

4.2.2.3 Inputs via PLC-INTERFACE terminal blocks

If you have defined a slot as an input, you can use PLC-INTERFACE terminal blocks from the sensor series with electromechanical or solid-state relays. You can connect different input voltages. The inputs via the PLC-INTERFACE terminal blocks are therefore electrically isolated between field and logic level as well as between the individual channels.



Data sheets for the PLC-INTERFACE terminal blocks can be found at phoenixcontact.net/products.



NOTE:

Voltages > 250 V are not permitted between the same terminal points on adjacent modules (L1, L2, L3).

Supply currents $\leq 6 \text{ A}$ directly to the corresponding terminal points. For higher currents, use the PLC-ESK GY power terminal block (Order No. 2966508).

Wiring of inputs via PLC-INTERFACE terminal blocks

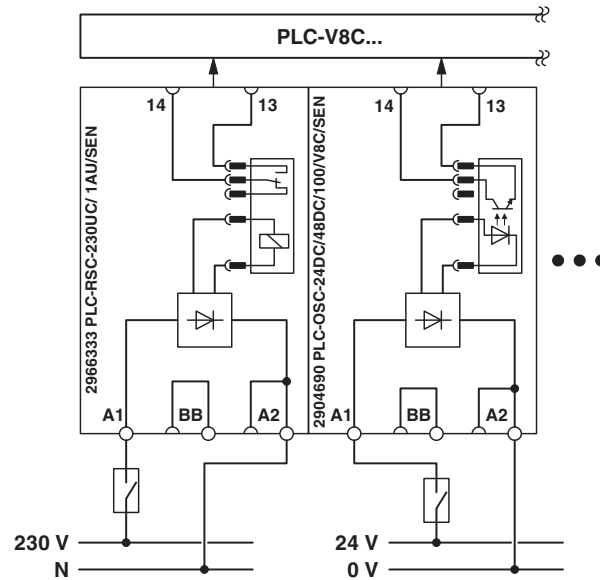


Figure 4-6 Wiring of inputs via PLC-INTERFACE terminal blocks

Basic circuit diagram with the example of an input terminal block with relay, 230 V AC (PLC-RSC-230UC/1 AU/SEN, Order No. 2966333) and an input terminal block with solid-state relay, 24 V DC (PLC-OSC-24DC/48DC/100V8C/SEN, Order No. 2904690).

Pin assignment of inputs via PLC-INTERFACE terminal blocks

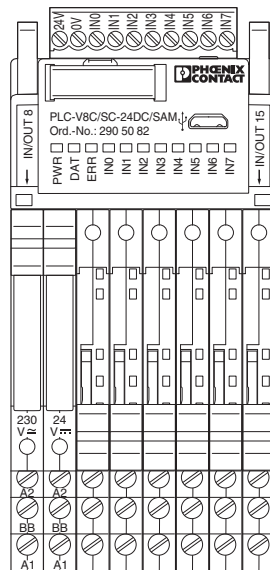


Figure 4-7 Pin assignment of inputs via PLC-INTERFACE terminal blocks

Connections of an input terminal block with relay, 230 V AC (PLC-RSC-230UC/1 AU/SEN, Order No. 2966333) and an input terminal block with solid-state relay, 24 V DC (PLC-OSC-24DC/48DC/100V8C/SEN, Order No. 2904690).



Corresponding PLC-INTERFACE terminal blocks for inputs can be found in Table 2-1 on page 14.

Optional convenient connection when wiring inputs via PLC-INTERFACE terminal blocks

The PLC-...SEN sensor series for input signals offers additional connection convenience. A separate external terminal block is not required for the respective switch supply. It can be connected to terminal point "BB".

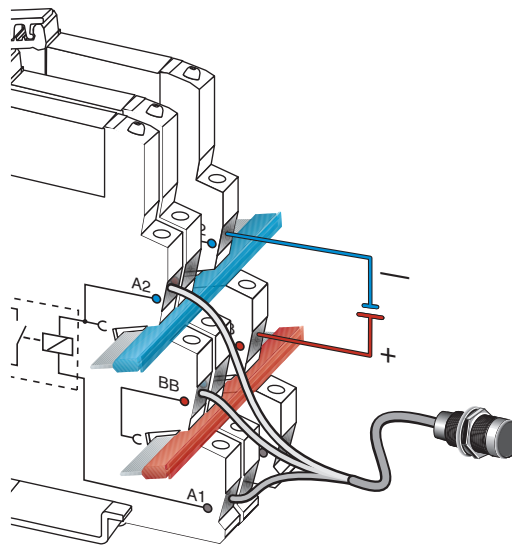


Figure 4-8 Convenient connection of the sensor series

4.2.2.4 Outputs via PLC-INTERFACE

When using PLC-INTERFACE terminal blocks, meet the requirements regarding noise emission for electrical and electronic equipment on the contact side.

In the event of a higher load and inductive load component, implement a contact protection circuit (e.g., freewheeling diode, varistor, RC element) at the load. This prevents interference voltages being coupled in to other system parts. The relays also achieve a longer electrical service life.



Data sheets for the PLC-INTERFACE terminal blocks can be found at phoenixcontact.net/products.



NOTE:

Voltages > 250 V are not permitted between the same terminal points on adjacent modules (L1, L2, L3).

Supply currents ≤ 6 A directly to the corresponding terminal points. For higher currents, use the PLC-ESK GY power terminal block (Order No. 2966508).

If you have defined a slot as an output, you can choose corresponding PLC-INTERFACE terminal blocks with electromechanical or solid-state relays.

Wiring of outputs via PLC-INTERFACE terminal blocks

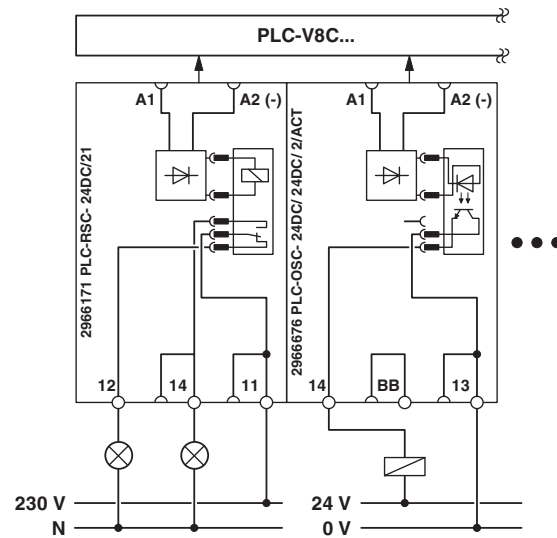


Figure 4-9 Wiring of outputs via PLC-INTERFACE terminal blocks

Basic circuit diagram with the example of an output terminal block with relay, 1 PDT (PLC-RSC-24DC/21, Order No. 2966171) and an output terminal block with solid-state relay, 24 V DC voltage output, and convenient actuator connection (PLC-OSC-24DC/24DC/2/ACT, Order No. 2966676).

Pin assignment of outputs via PLC-INTERFACE terminal blocks

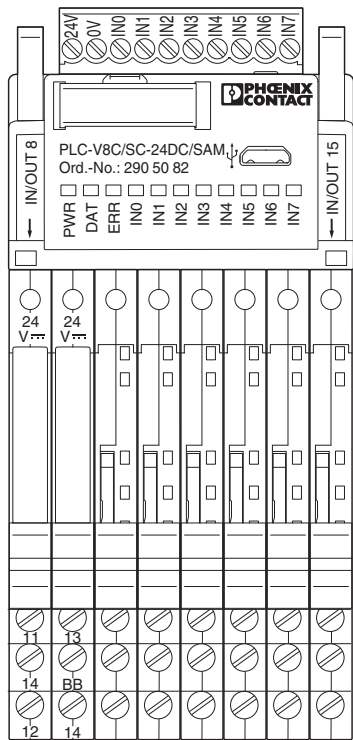


Figure 4-10 Pin assignment of outputs via PLC-INTERFACE terminal blocks

Connections of an output terminal block with relay, 1 PDT (PLC-RSC-24DC/21, Order No. 2966171) and an output terminal block with solid-state relay, 24 V DC voltage output, and convenient actuator connection (PLC-OSC-24DC/24DC/2/ACT, Order No. 2966676).



Corresponding PLC-INTERFACE terminal blocks for outputs can be found in Table 2-1 on page 14.

Optional convenient connection when wiring outputs via PLC-INTERFACE terminal blocks

The PLC-...ACT actuator series for output signals offers additional connection convenience. A separate external output modular terminal block is not required for the load return conductor. It can be connected to terminal point "BB".

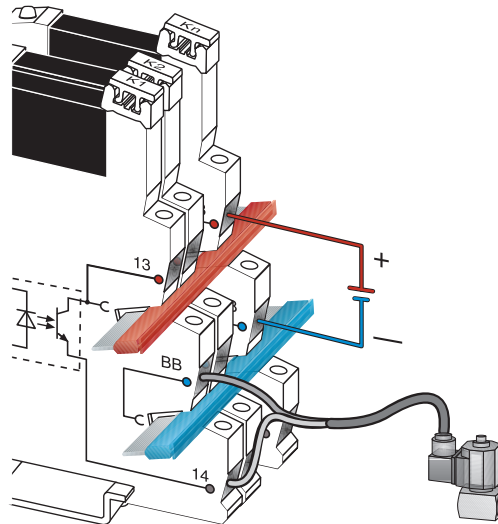


Figure 4-11 Convenient connection of the actuator series

4.3 Micro USB connection

The micro USB connection can be used for communication between a PC and PLC logic. A standard micro USB A to USB B connecting cable, e.g., CAB-USB A/MICRO USB B/2,0M (Order No. 2701626), is required for the connection between PLC logic and a PC.

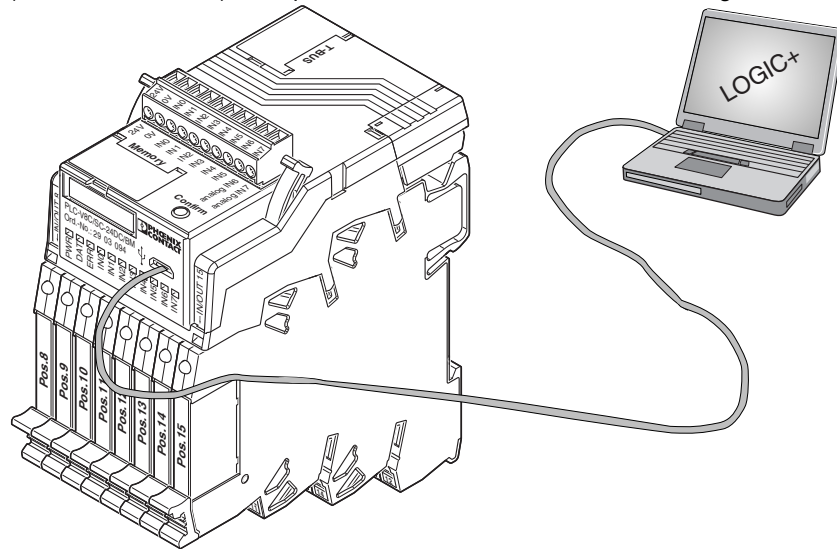


Figure 4-12 PLC logic and PC connection

5 Startup

5.1 LOGIC+ software installation

The required LOGIC+ software can be downloaded free of charge at phoenixcontact.net/products. After downloading, follow the installation instructions to the end.

5.2 Connection to the PC

If PLC logic is mounted as described in Section 3 on page 19, supply each of the logic modules with power. The PWR LED now lights up on every logic module.

Connect PLC logic to the PC (see Section 4.3 on page 44).

When the software is started, it automatically detects the PLC-V8C logic module as soon as the USB connection is established. The necessary drivers are also installed automatically.



Administrator rights may be required to install the drivers.

If autostart is deactivated on your operating system and the drivers are not installed automatically, proceed as follows:

1. Open Windows Explorer.
A new emulated CD drive should be displayed: "CDROM".
2. Open the "CDROM" drive.
3. Start the "Setup.exe" file.
4. The driver is installed.

If the emulated CD drive is not displayed, you can also download the setup file for driver installation at phoenixcontact.net/products. After manual installation, remove the USB cable from the device and insert it again. The driver should now be correctly identified.

If the driver has been correctly identified, "Phoenix CDC ECM Network Adapter" appears under "Network adapters" in the Windows Device Manager.



An Ethernet network adapter is emulated via USB. This connection may be blocked by the firewall you are using. If so, contact your system administrator.

5.3 Configuration via web server

You can access the web server in a web browser by calling page `http://v8c_usb`.



Internet Explorer 10 or Mozilla Firefox 10 is required as a minimum in order to use the full scope of functions of the web server.

5.3.1 Monitoring, Diagnose

5.3.1.1 Overview

Important device and project information is displayed on the overview page.

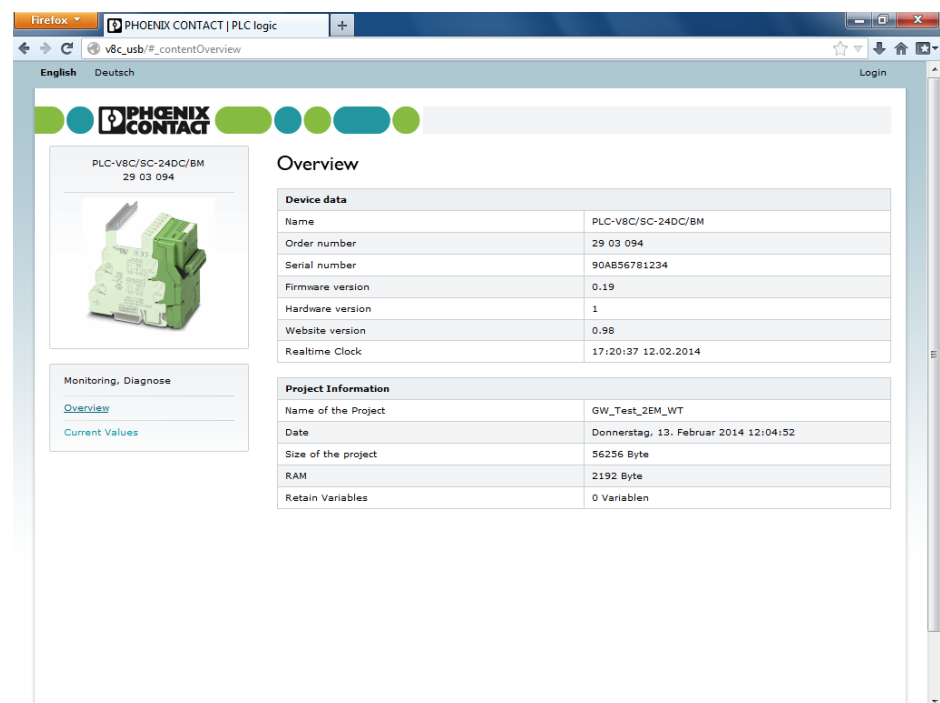
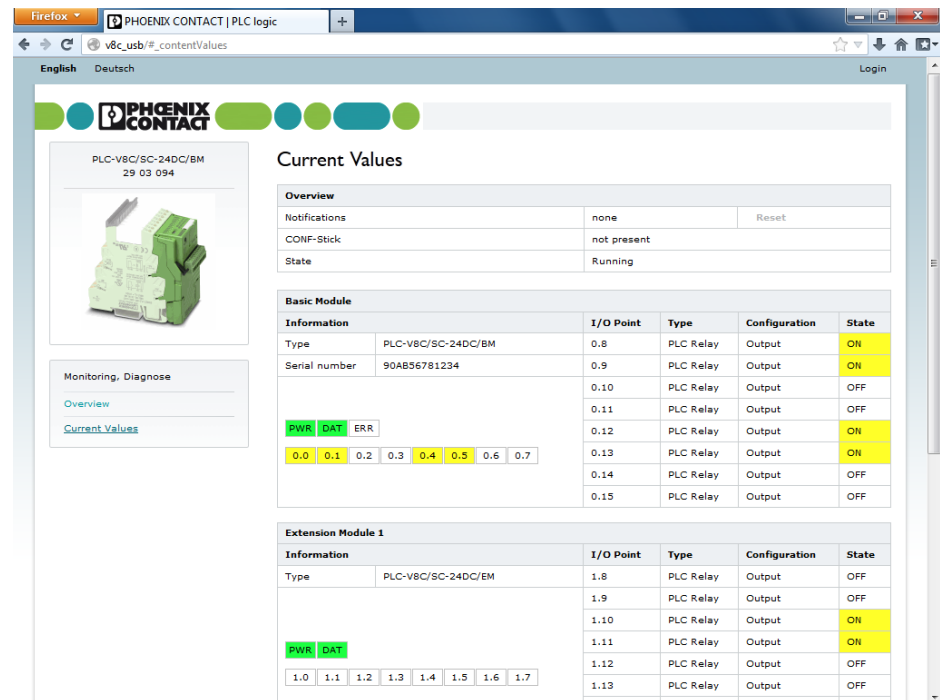


Figure 5-1 Overview

5.3.1.2 Current Values

Current values/states of the hardware are displayed on this page, such as input and output states and error messages.



PLC-V8C/SC-24DC/BM
29 03 094

Monitoring, Diagnose
Overview
Current Values

Current Values

Overview

Notifications	none	Reset
CONF-Stick	not present	
State	Running	

Basic Module

Information	I/O Point	Type	Configuration	State	
Type	PLC-V8C/SC-24DC/BM	0.8	PLC Relay	Output	ON
Serial number	90AB56781234	0.9	PLC Relay	Output	ON
		0.10	PLC Relay	Output	OFF
		0.11	PLC Relay	Output	OFF
		0.12	PLC Relay	Output	ON
		0.13	PLC Relay	Output	ON
		0.14	PLC Relay	Output	OFF
		0.15	PLC Relay	Output	OFF

PWR DAT ERR

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7

Extension Module 1

Information	I/O Point	Type	Configuration	State	
Type	PLC-V8C/SC-24DC/EM	1.8	PLC Relay	Output	OFF
		1.9	PLC Relay	Output	OFF
		1.10	PLC Relay	Output	ON
		1.11	PLC Relay	Output	ON
		1.12	PLC Relay	Output	OFF
		1.13	PLC Relay	Output	OFF

PWR DAT

1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7

Figure 5-2 Current Values

5.3.2 Login

The configuration of the logic module is protected by a user name and password. To log into the logic module, click on the “Login” button in the top right corner.

Use the following for standard login:

- User name: admin
- Password: admin

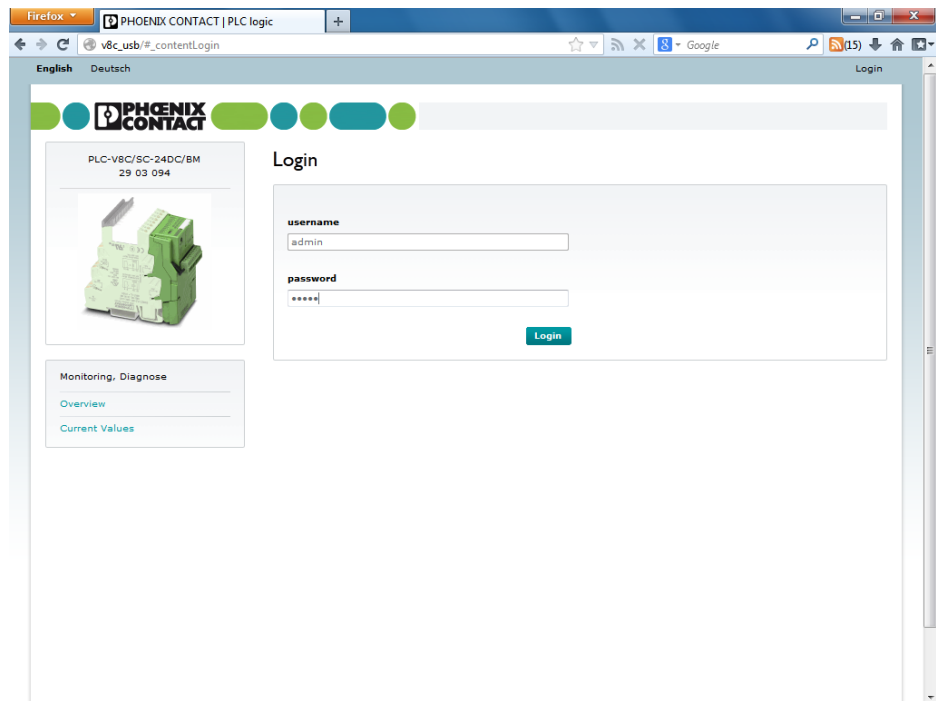


Figure 5-3 Login

5.3.3 Configuration

5.3.3.1 Global

You can enter information for device identification on this page. You can synchronize the real-time clock with the system time of the connected computer or set it manually.

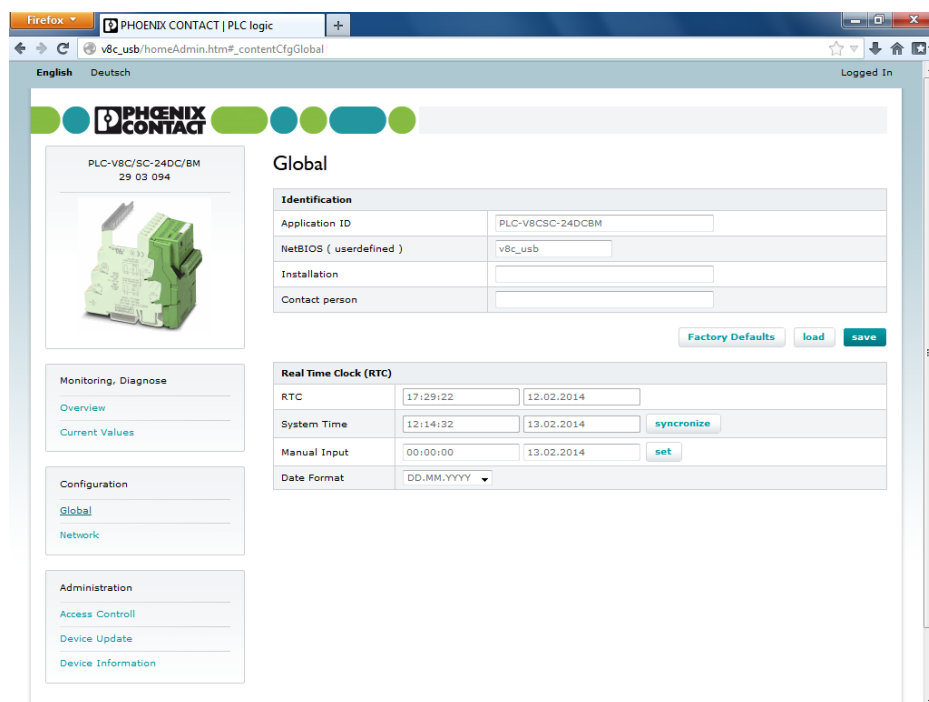


Figure 5-4 General configuration settings

Parameter	Description	Selection	Default setting
Application ID	The application ID is used to clearly identify the components within the system.	- Min. 2 characters - Max. 32 characters - Letters or numbers	PLC_logic
NetBIOS (user-defined)	The integrated web server of the logic module can be called in the web browser using this name (http:\\<NetBIOS>).	- Min. 2 characters - Max. 16 characters - Letters or numbers	v8c_usb
Installation (optional)	Information regarding the installation location can be entered here.	- Min. 2 characters - Max. 32 characters - All Latin fonts and all standard special characters	
Contact person (optional)	Information regarding the contact person can be entered here.	- Min. 2 characters - Max. 32 characters - All Latin fonts and all standard special characters	

5.3.3.2 Network

Settings for the IP address can be made on this page. Do not make changes in this area unless you have been specifically requested to do so by PHOENIX CONTACT Support. Incorrect settings may mean that the device has to be sent in for servicing.

The device provides a subnetwork (255.255.255.252). The device assigns the first host address of the selected subnetwork to itself. The second address is assigned to the connected PC.

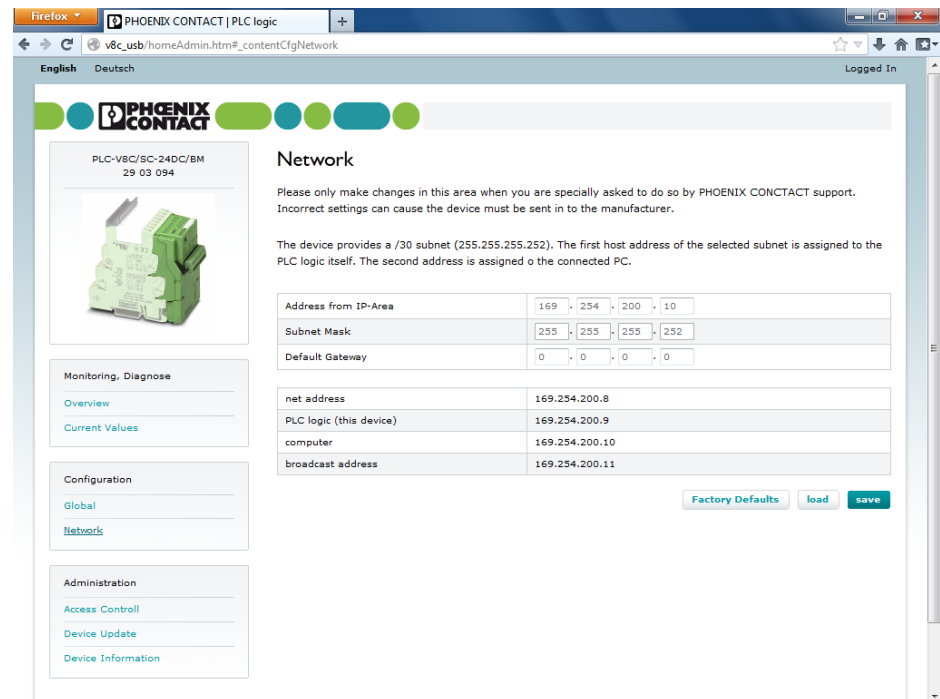


Figure 5-5 Setting the IP address

Parameter	Description	Selection	Default setting
Address from IP-Area	Internet Protocol address (IP address) of the connected computer	- Min. 0 - Max. 255	169.254.200.10
Subnet Mask	Subnet mask of the logic module	- Min. 0 - Max. 255	255255255252
Default Gateway	Default gateway of the logic module	- Min. 0 - Max. 255	0.0.0.0

5.3.4 Administration

5.3.4.1 Access Control

You can set the password for access control to the web server and LOGIC+ on this page.



NOTE:

If you forget the password, you must contact PHOENIX CONTACT Support.

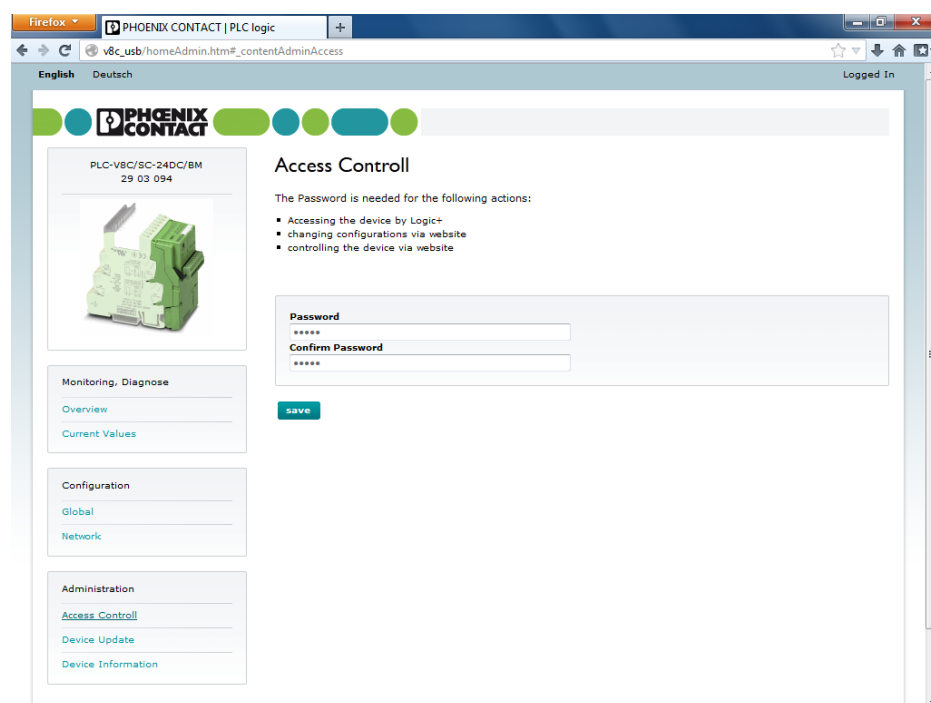


Figure 5-6 Setting the password

Parameter	Description	Selection	Default setting
Password	Enter the new password	– Min. 2 characters – Max. 32 characters – A-Z, a-z, 0-9	admin
Confirm Password	Enter the new password again	– Min. 2 characters – Max. 32 characters – A-Z, a-z, 0-9	admin

5.3.4.2 Device Update

If new firmware is available for the basic module, you can start the firmware update on this page.

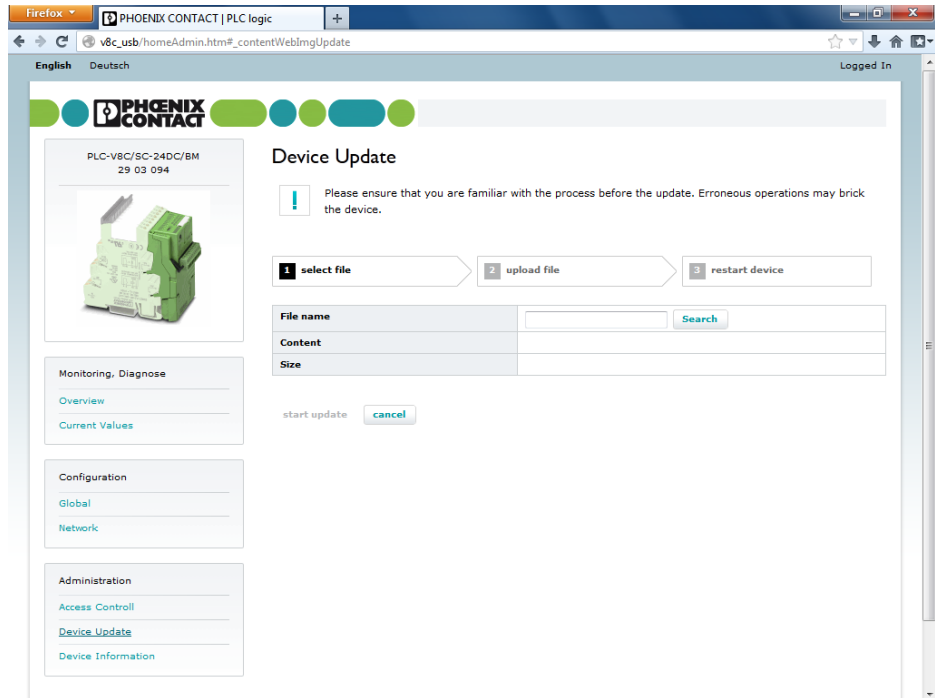


Figure 5-7 Starting firmware update

Click on the “Search” button and then navigate to the storage location for the firmware update.

The update can then be started if a valid file has been detected. To do this, click on the “start update” button.

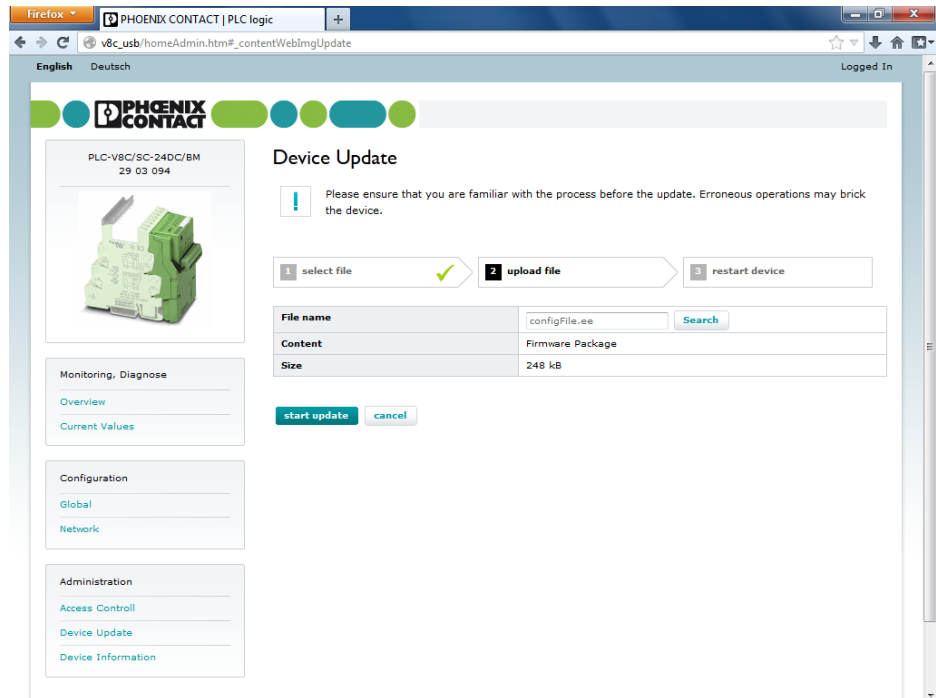


Figure 5-8 Firmware update - file selection

The current progress is displayed during the update.

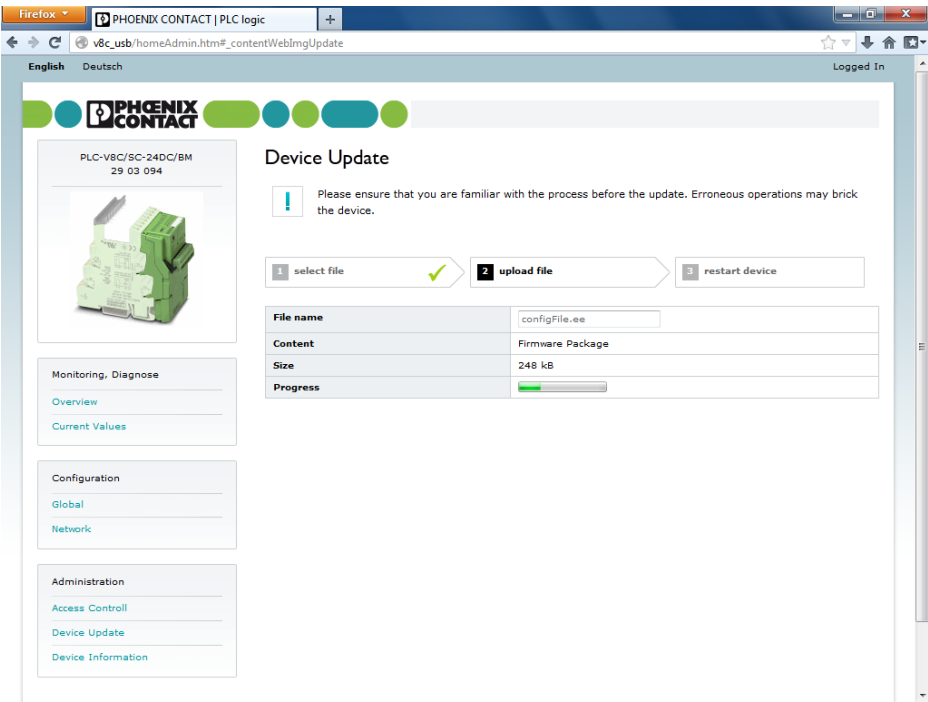


Figure 5-9 Firmware update - progress indicator

Following successfully installation, the device restarts automatically. To view the active device configuration following restart, you must empty the browser cache (e.g., with Ctrl + Shift + Delete).

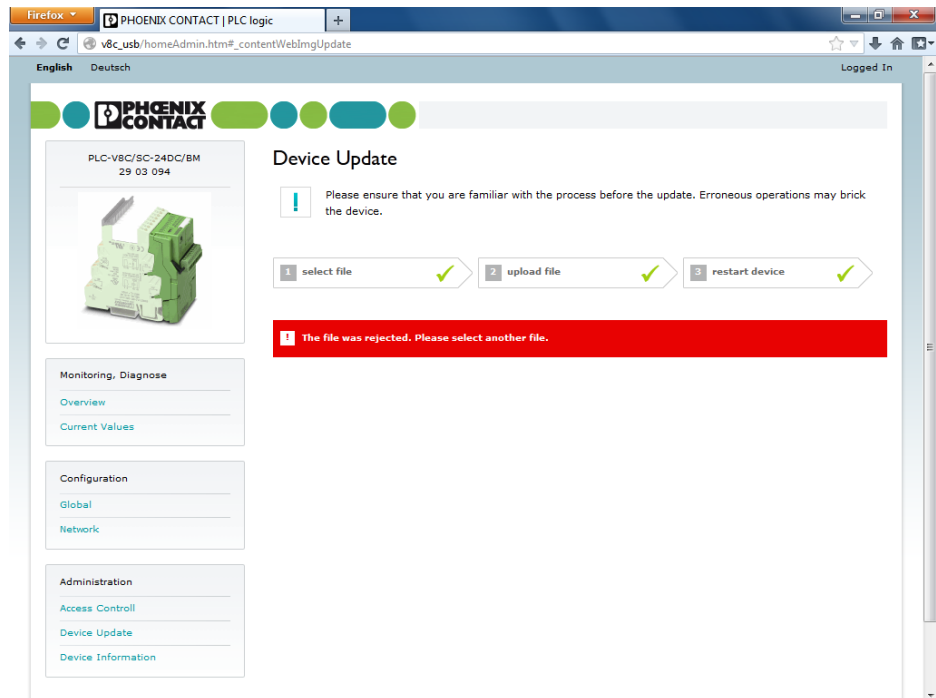
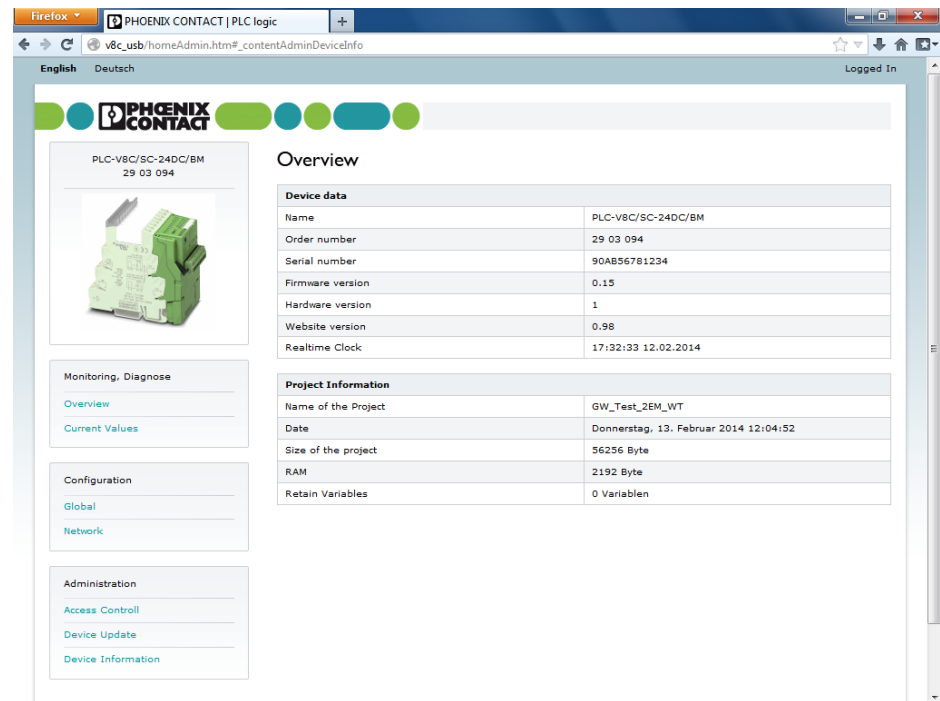


Figure 5-10 Firmware update - emptying the cache

5.3.4.3 Device Information (Overview)

All important information is displayed on this page, such as:

- Serial number of the logic module
- Firmware version
- IP configuration
- eCLR information



The screenshot shows a web browser window with the address bar displaying "v8c_usb/homeAdmin.htm#_contentAdminDeviceInfo". The page title is "PHOENIX CONTACT | PLC logic". The interface is in English. The main content area is titled "Overview" and displays the following information:

Device data

Name	PLC-V8C/SC-24DC/BM
Order number	29 03 094
Serial number	90AB56781234
Firmware version	0.15
Hardware version	1
Website version	0.98
Realtime Clock	17:32:33 12.02.2014

Project Information

Name of the Project	GW_Test_2EM_WT
Date	Donnerstag, 13. Februar 2014 12:04:52
Size of the project	56256 Byte
RAM	2192 Byte
Retain Variables	0 Variablen

On the left side of the page, there is a sidebar with the following sections:

- Monitoring, Diagnose**
 - Overview
 - Current Values
- Configuration**
 - Global
 - Network
- Administration**
 - Access Controll
 - Device Update
 - Device Information

Figure 5-11 Overview of device information

5.4 Programming with LOGIC+

LOGIC+ is used for the configuration, programming, and parameterization of PLC logic. LOGIC+ allows you to conveniently develop the project on your own PC and to then send the project to the connected device and execute it on PLC logic. LOGIC+ supports you in every phase of project development, from project planning and configuration/parameterization to program start.



A detailed description of the LOGIC+ software can be found under “Help” in the software. Please read this information carefully before creating your first project.

5.4.1 System requirements

The following software and hardware requirements must be met so that LOGIC+ can be executed on your PC under one of the operating systems listed.

Table 5-1 Windows XP Service Pack 3

Designation	Description
Processor	Pentium 233 MHz or faster, 300 MHz recommended
RAM	1 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.NET Framework 4.0	The link to the download is provided in the setup routine.

Table 5-2 Windows Vista Service Pack 1

Designation	Description
Processor	32-bit processor (x86) or 64-bit processor (x64), each with at least 1 GHz
RAM	1 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.NET Framework 4.5	The link to the download is provided in the setup routine.

Table 5-3 Windows 7

Designation	Description
Processor	1 GHz or faster 32-bit (x86) or 64-bit processor (x64)
RAM	2 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.NET Framework 4.5	The link to the download is provided in the setup routine.

Table 5-4 Windows 8

Designation	Description
Processor	1 GHz or faster 32-bit (x86) or 64-bit processor (x64)
RAM	2 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.NET Framework 4.5	Is installed

Additional requirements

- Input devices: keyboard, mouse
- USB connection to connect the device
- Internet browser

5.4.2 Starting LOGIC+

Following successful installation on the PC, open LOGIC+.

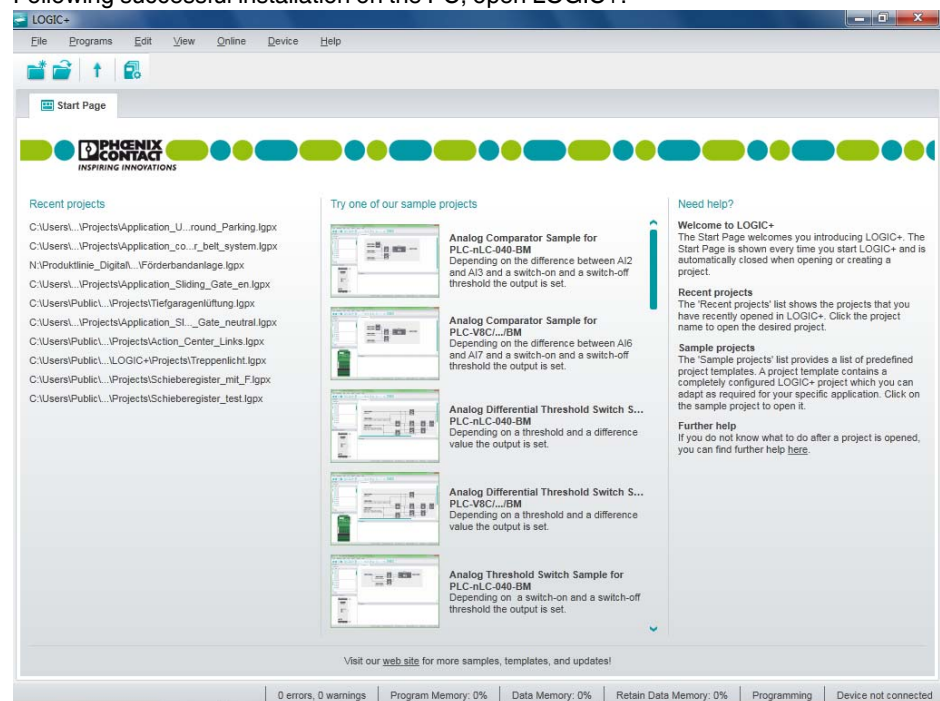


Figure 5-12 LOGIC+ start page

The start page is displayed every time you open LOGIC+ and is closed automatically as soon as you open or create a project.

You should now familiarize yourself with LOGIC+ by calling "Help" in the menu bar.

5.4.2.1 Description of the LOGIC+ interface

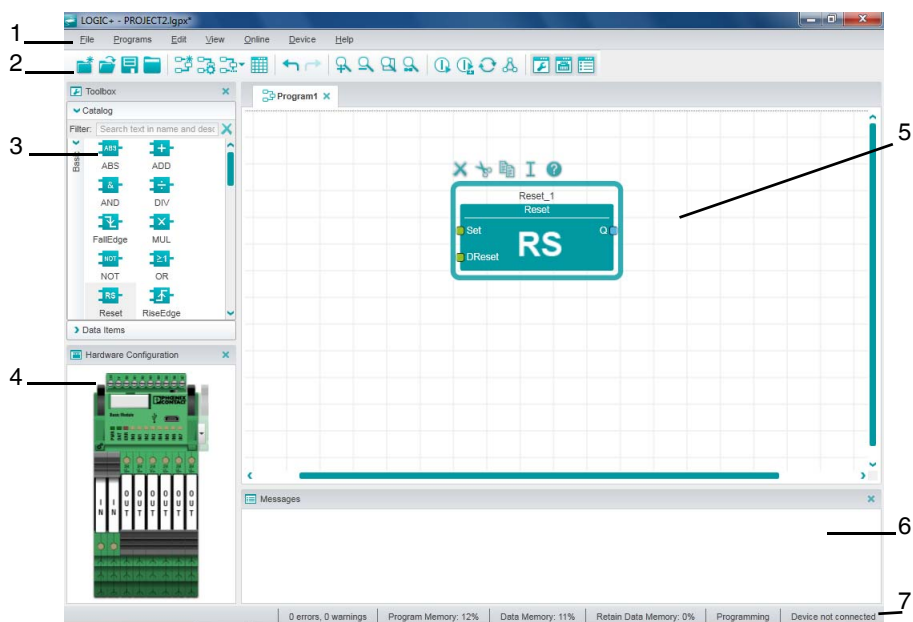


Figure 5-13 LOGIC+ interface

Table 5-5 Areas of the LOGIC+ interface

No.	Area	Description
1	Menu bar	Provides access to the LOGIC+ commands and online help.
2	Toolbar	Provides access to frequently used commands.
3	Toolbox	Contains all elements that are required for programming. Elements from the toolbox are always added to the program by means of drag and drop.
4	Hardware configuration	Provides a graphical representation of the device. You can configure the inputs and outputs of the connected device here.
5	Graphical editor	Workspace where you develop your program. Graphical objects from the toolbox and input/output signals from the hardware configuration are inserted in the workspace and then connected by means of drag and drop.
6	Message window	Displays all messages output by LOGIC+.
7	Status bar	Displays the status of the communication connection between the PC and the connected device, the number of errors and warnings, plus the memory used and the device status.

Table 5-6 Buttons in the toolbar

Icon	Meaning	Keyboard shortcut
	Create a new project	Ctrl + N
	Open an existing project	Ctrl + O
	Save the current project	Ctrl + S
	Close the current project	
	Create a new program	
	Rename or delete a program or change the program execution order	
	Open a program or switch to an open program	
	Open the data item editor	
	Undo	Ctrl + Z
	Redo	Ctrl + Y
	Increase size of object displayed in the active program window	
	Decrease size of object displayed in the active program window	
	Resize contents of active window to the default size	
	Displays the full contents in the current window size	
	Execute program on simulated device	F5
	Execute program on the device	

Table 5-6 Buttons in the toolbar [...]

Icon	Meaning	Keyboard shortcut
	Stop program execution and reset the device	
	Open the communication settings	
	Show or hide the toolbox window	
	Show or hide the hardware configuration	
	Show or hide the message window	
	Resume execution	Alt + F5
	Pause execution	Shift + F5
	Execute a step in the procedure	F10
	Switch to the breakpoint at the current point	F9
	Remove all breakpoints in the active program worksheet	
	Activate/deactivate breakpoint at the current position	
	Lock all breakpoints in the active program worksheet	
	Switch back to programming	Ctrl + F5
	Show or hide the watch window	

5.4.3 Hardware configuration

**NOTE:**

PLC logic does **not** check that the hardware view in LOGIC+ matches the actual hardware. The hardware configuration in LOGIC+ and the configuration of the connected device on which the project is to be executed must be identical. This means that the arrangement of the segments and the assignment of the inputs and outputs in the hardware configuration in LOGIC+ and for the connected device must be the same.

Make sure that both configurations match. Otherwise this may result in undesirable behavior in the application. Make sure that this will not lead to any hazardous situations.

Each relay channel can be configured as an input or output with an electromechanical or a solid-state relay. This can be performed easily in the hardware configuration in LOGIC+.

For more details, refer to the help in LOGIC+.

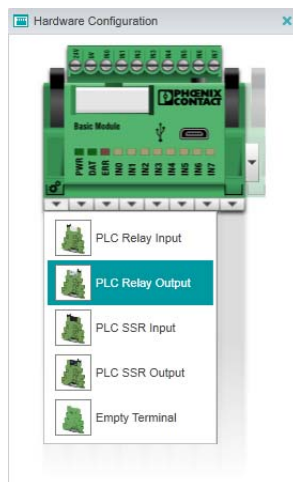


Figure 5-14 Hardware configuration

5.4.4 Function blocks

As described in the LOGIC+ help, programs can be created in function block diagram (FBD) or ladder diagram (LD). The following function blocks are available in LOGIC+ for both languages.

Table 5-7 Available function blocks

Block	Description
ABS	Mathematical calculation of the absolute value
ADD	Mathematical addition
AND	Logical AND
Counter	Up/down counter
DIV	Mathematical division
EQ	"Is equal" comparator
FallEdge	Detect falling edge
GE	"Greater than or equal to" comparator
GT	"Greater than" comparator
LE	"Less than or equal to" comparator
LT	"Less than" comparator
MUL	Mathematical multiplication
NOT	Invert state
OffDelay	Timer for switch-off delay
OnDelay	Timer for switch-on delay
OR	Logical OR
PulseGen	Pulse generator
PulseTimer	Output pulse with a defined pulse length
Reset	Self-holding relay with reset priority
RiseEdge	Detect rising edge
Set	Self-holding relay with set priority
SUB	Mathematical subtraction
WeekTimer	Weekly timer
XOR	Exclusive OR

5.4.5 Data item types in LOGIC+

Table 5-8 Data item types

Name	Description	Value range
Flags	The flag name consists of the string "F_xxx" (where xxx = 0...127) and, if defined, the identifier. A maximum of 128 flags can be used in a project.	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Registers	The register name consists of the string "R_xxx" (where xxx = 0...127) and, if defined, the identifier. A maximum of 128 registers can be used in a project.	Numerical value (integer value only) -2,147,483,648 to 2,147,483,647
Digital inputs	Digital inputs have the designation "DI_x_y", where x is the device number (basic logic module = 0) and y is the input number. The number of available digital inputs depends on the device configuration. See "Inputs and outputs" on page 34	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Digital outputs	Digital outputs have the designation "DQ_x_y", where x is the device number (basic logic module = 0) and y is the output number. The number of available digital outputs depends on the device configuration. See "Inputs and outputs" on page 34	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Analog inputs	Analog inputs are used to monitor voltages or values. Analog inputs have the designation "AI_x_y", where x is the device number (basic logic module = 0) and y is the input number. The number of available analog inputs depends on the device configuration. See "Inputs and outputs" on page 34	Numerical value (integer value only). Value range: 0 to 1000 The analog inputs at IN6 and IN7 process 0 V ... 10 V input signals. PLC logic analog values: 0 V ... 10 V Values in LOGIC+: 0 ... 1000 Voltage values in 10 mV increments can therefore be read from PLC logic in LOGIC+.
INTERFACE system inputs	Inputs that come from a gateway have the designation IFS_Input_x (where x = 0...15). See "Communication with PLC logic" on page 75	Numerical value (integer value only) Value range: -32,768 to 32,767
INTERFACE system outputs	Outputs that are transferred to a gateway have the designation IFS_Output_x (where x = 0...15). See "Communication with PLC logic" on page 75	Numerical value (integer value only) Value range: -32,768 to 32,767

5.4.6 Connecting the device to LOGIC+

In order that a project can be executed on the device and monitored in online mode or that device parameters can be set and the project sources can be uploaded from the device, the device must be connected to the PC and detected by LOGIC+. Here, connection means that:

- The device must be connected to the PC on which LOGIC+ is executed via a USB cable
- The communication parameters in LOGIC+ must be set so that LOGIC+ can access the device

The device has a micro USB connection for connection to the PC on which LOGIC+ is running. When the device is connected to the PC for the first time, the operating system automatically installs a driver (a driver is a program that informs that operating system how it can communicate with the connected device). This enables communication between the PC and device.

Use a USB cable to connect PLC logic to a free USB connection on your PC on which LOGIC+ is running. Select “File > Communication Settings” or click on the “Communication Settings” button in the toolbar to open the “Communication Settings” dialog box.

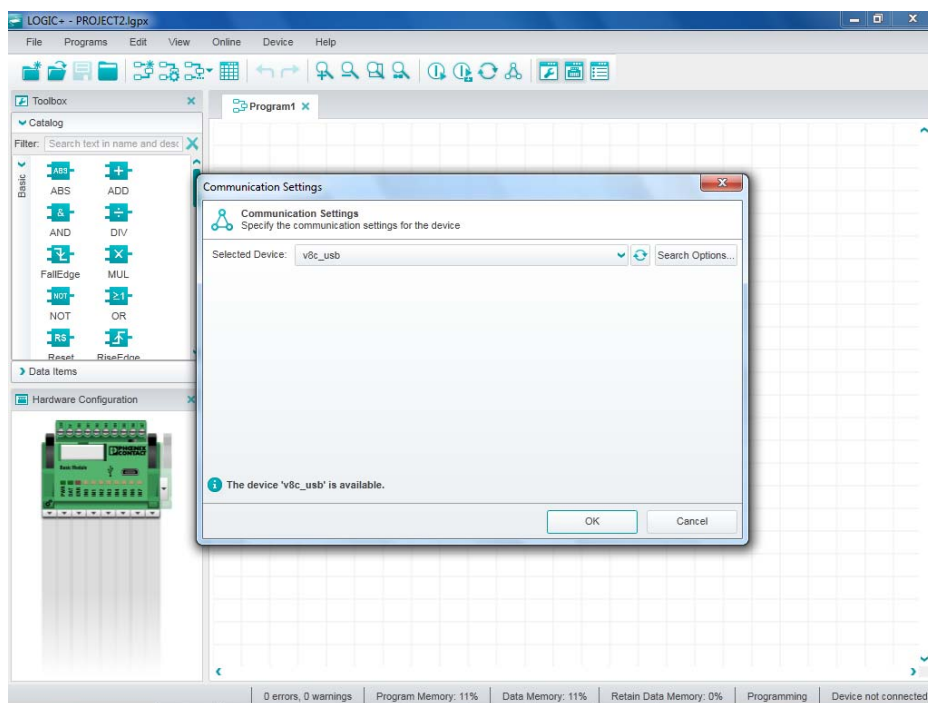


Figure 5-15 Communication Settings

In the “Communication Settings” dialog box, select the device that is connected to your PC in the “Selected Device” list box. The device name corresponds to the NetBIOS name specified on the device configuration page. The default NetBIOS name is “v8c_usb”.

For information on how to open the configuration page and change the NetBIOS name, see “Configuration via web server” on page 46.

As soon as LOGIC+ detects the connected device at the USB connection, the message "The device <device name> is available" appears at the bottom of the dialog box (see figure above). If the device is not found, a corresponding message appears in the dialog box. If so, check whether the device is connected correctly to the PC or select a different device.

You can cancel this operation with "Cancel". Click "OK" to close the "Communication Settings" dialog box again.

5.4.7 Executing a project on PLC logic



NOTE:

The project is immediately executed (started) on the device and online mode is activated when you click on the "Execute on device" button. Make sure that this will not lead to any hazardous situations.

The integrated simulation can be used to test the behavior of the project with no device connected.

Password protection

The project can be protected against unauthorized transfer and execution on the device with a password. This password is checked every time the "Execute on device" command is performed. If the device has been assigned a password, you must enter it in a dialog box before transferring and executing the project on the device. The device password can be changed on the device configuration page. For information on how to open this page and change the password, see "Configuration via web server" on page 46.

To execute the project on the device and switch to online mode, proceed as follows:

1. Make sure that there are no error messages regarding the project in the message window.
2. Make sure that the configuration of the inputs and outputs in the hardware configuration corresponds to the configuration of the inputs and outputs on the device. If this is not the case, change the hardware configuration in LOGIC+.
3. Select "Online > Execute on device" or click on the "Execute on device" button in the toolbar.

After successfully transferring and starting the project on the device, online mode is activated and the watch window appears at the bottom of the program window. The toolbar contains additional buttons which can be used to control the device and debug the active project. The status bar displays the states "Running" and "Device connected".

While the project is being executed on the device and online mode is activated, you can:

- Monitor the active project in online mode
- Stop and resume the active project
- Debug the project by overwriting values
- Group data items and inputs/outputs from several programs in the watch window in order to view their online values at a glance and debug the project

To return to programming mode, click on the "Back to programming" button in the toolbar or use the keyboard shortcut <Ctrl> + <F5>.

Behavior during transfer

Depending on the current device status indicated in the status bar (for example, a project is being cyclically executed on the device or project execution has been stopped) and on the project loaded in the internal memory of the device, LOGIC+ behaves differently when a project is executed.

The following generally applies: each time the “Execute on device” button is pressed, LOGIC+ checks whether a project is already stored on the device. If the project on the device and the project to be transferred are not identical, the device is reset and the current project is transferred to the device and executed immediately. If the project on the device and the LOGIC+ project are identical, the project is executed immediately.

5.4.8 Memory and size of a program

The project size is limited by the memory available on the connected device. During programming, LOGIC+ monitors the memory used. The current memory used on the device is indicated by a percentage value in the status bar.

Among other things, the project size depends on the number of different function blocks.

5.4.9 Cycle time

The cycle time is the time required to process a complete program once. The time required for one program cycle can be determined by the following example program.

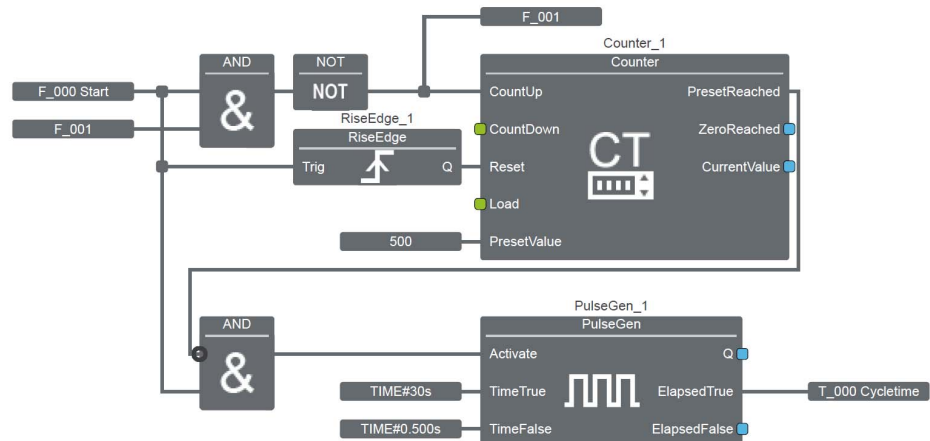


Figure 5-16 Determining the cycle time

This example program can be inserted in programs that have been created and indicates the cycle time of the program created. Overwrite flag “F_000_Start” with TRUE to start the calculation. The program counts 1000 cycles and indicates the time required for this in time register “T_000 Cyclotime”. This value must then be divided by 1000 to determine the value for one cycle.

Example: T_000 indicates the value “T#1.996s”.

The cycle time is therefore 1.996 ms.

5.5 IFS-CONFSTICK (memory)

PLC logic programs are stored using the IFS-CONFSTICK memory module (Order No. 2986122) or programs can be easily transferred to other devices.

If settings such as time or date are required on the new device, these values can be configured via the integrated web server. The new device does not need access to the LOGIC+ software for this.

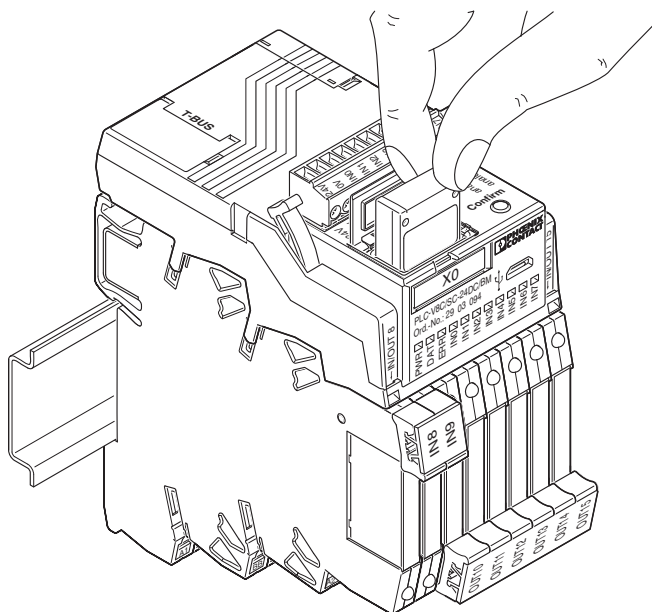


Figure 5-17 Inserting the IFS-CONFSTICK

5.5.1 Writing the device configuration and program to the IFS-CONFSTICK

1. Press the Confirm button on the logic module.
2. Insert the memory module in the logic module within 4 s.
The copying of the configuration and program is started.
The DAT LED flashes while saving.
The DAT LED goes out when backup is completed.
3. Remove the memory module.

5.5.2 Running the device configuration and program on the logic module

1. Insert the memory module in the logic module.
The configuration/program is checked automatically. If another configuration/program is detected on the device, the DAT and ERR LEDs flash alternately.
2. Press the Confirm button within 6 s.
The copying of the configuration and program is started (DAT LED flashes).
An automatic restart is then performed (PWR and ERR LEDs flash simultaneously).
The process has been completed once the PWR LED is permanently on.

5.6 Integration in PROFIBUS DP

An adaptable EM-PB-GATEWAY-IFS, which is available as an option, can be used to integrate PLC logic into a PROFIBUS DP network. This enables communication with a higher-level controller for remote control, diagnostics, and visualization purposes.

The following components are required for this.

Table 5-9 Components for integration in PROFIBUS DP

Description	Order No.	Order designation
Gateway for PROFIBUS DP	2297620	EM-PB-GATEWAY-IFS
Programming adapter for the PROFIBUS gateway	2320500	IFS-USB-DATACABLE
DIN rail connector	2707437	ME22,5 TBUS 1,5/5-ST-3,81 GN
Connecting cable for connecting PLC logic to the DIN rail connector, length: 30 cm	2905263	PLC-V8C/CAB/TBUS/0,3M

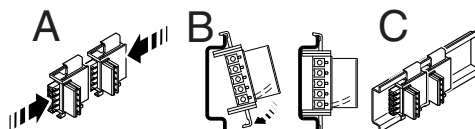
The following downloads are also required.

Go to phoenixcontact.com and enter “EM-PB-GATEWAY-IFS” or “2297620” in the search field. The following tools can be found under Downloads:

- IFS-CONF-SUITE-INTERFACE Setup (FDT Container: IFS-CONF + INTERFACE SYSTEM DTMs + INTERFACE ANALOG DTMs + USB driver) IFS-CONF-SUITE-INTERFACE_1v20.zip
- GSD file for EM-PB-GATEWAY-IFS in conjunction with EMM ... IFS, PSR-TRISAFE-M, and PSR-TRISAFE-S.

5.6.1 Mounting

1. Snap the DIN rail connector onto the DIN rail.



2. Snap the gateway onto the DIN rail connector.

The gateway is positioned mechanically using the DIN rail connector. The connections on the bottom of the gateway make contact with the connections on the DIN rail connector.

3. Connect the TBUS connection on the PLC-V8C logic module to the DIN rail connector using the appropriate PLC-V8C/CAB/TBUS/0,3M cable (Order No. 2905263).

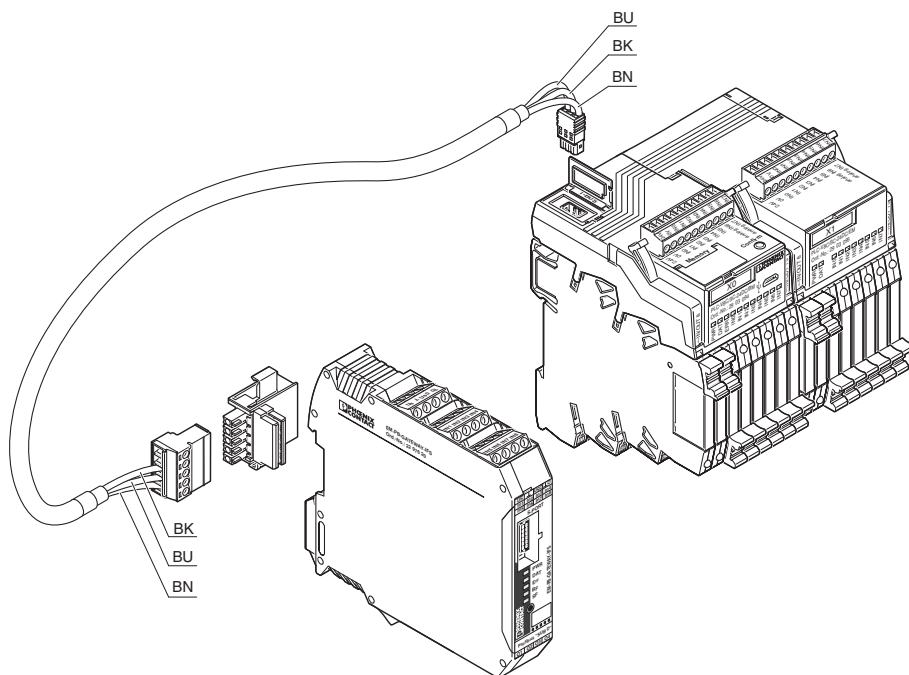


Figure 5-18 Mounting the PROFIBUS gateway and PLC logic

Depending on the design, only one PLC logic device can be connected to the gateway and therefore in this combination only one PLC logic device can be integrated into a PROFIBUS network.

5.6.2 EM-PB-GATEWAY-IFS gateway

Before starting up the gateway, carefully read through the package slip supplied with the device. For detailed information on the gateway, refer to the gateway system manual available at phoenixcontact.net/products.

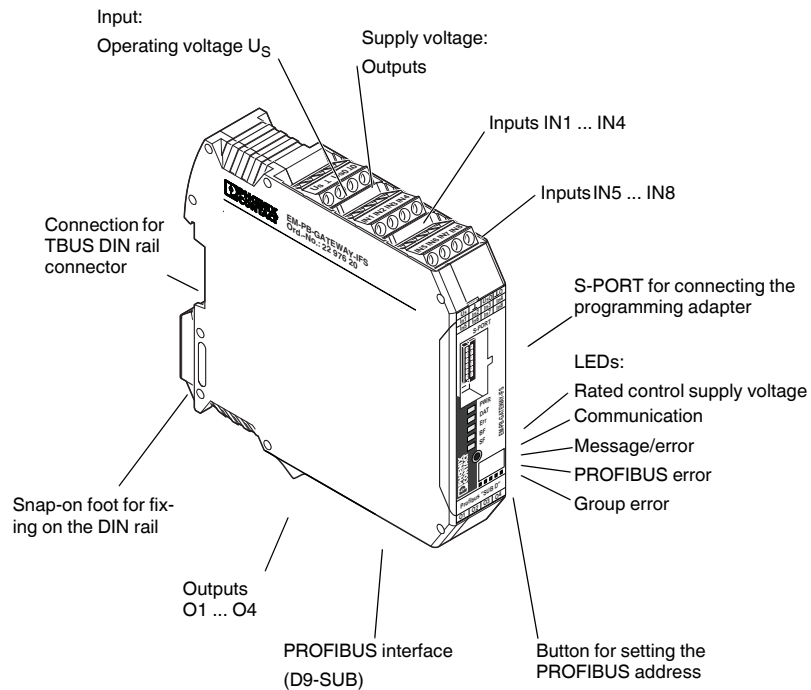


Figure 5-19 EM-PB-GATEWAY-IFS

The EM-PB-GATEWAY-IFS PROFIBUS module (Order No. 2297620) is a module that enables PLC logic to be connected to PROFIBUS DP. The module is certified according to specification DPV1 (EN 50170). The EM-PB-GATEWAY-IFS can communicate with PLC logic via TBUS and an appropriate connecting cable. The assignment of the process data can be individually adapted to the application requirements by means of the GSD file (device master data). The GSD file (containing the characteristic communication features of the PROFIBUS module) is available on the Internet at phoenixcontact.net/products. The PROFIBUS address is set using a button and/or a device (PC, memory stick, actuator) connected to the S-PORT as an option. The module does not provide PROFIBUS termination, an appropriate plug should be used for this, if required.

5.6.3 Block diagram

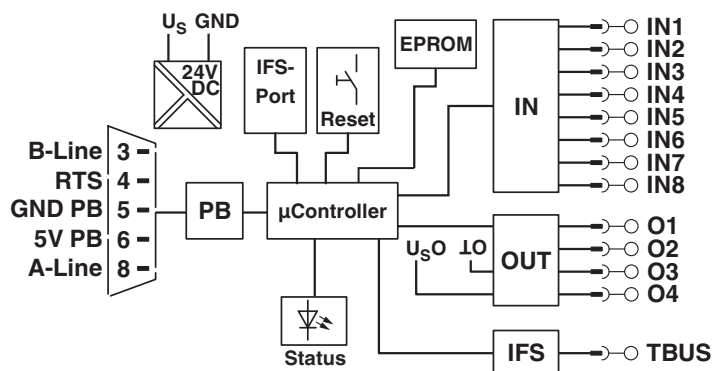


Figure 5-20 Block diagram

5.6.4 Status LEDs

Five LEDs visualize the various operating states of the gateway.



The status LEDs are used to indicate the PROFIBUS address and the addresses of the connected IFS devices in parameterization mode when setting the address.

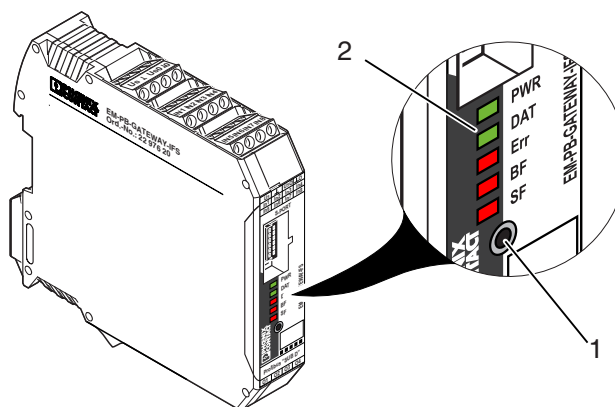


Figure 5-21 Status LEDs

- 1 Button for setting the PROFIBUS address
- 2 Status LEDs

LED	Description
PWR LED (green)	Device status
Off	No supply voltage. Microcontroller does not start.
On	Supply voltage OK. Microcontroller is running.
Flashing at 1.4 Hz (slow)	Setting the PROFIBUS address
Flashing at 2.8 Hz (fast)	IFS address assignment

LED [...]	Description
DAT LED (green) Off On Flashing at 1.4 Hz (slow)	Communication No data traffic Cyclic data traffic Device is being configured
ERR LED (red) Off On Flashing at 2.8 Hz (fast)	Device or process error No error Serious internal error I/O error, e.g., overload of the output driver
BF LED (red) Off On Flashing at 1.4 Hz (slow) Flashing at 2.8 Hz (fast)	PROFIBUS error No error No cyclic data exchange (C1 master not present) PROFIBUS parameterization invalid PROFIBUS configuration invalid
SF LED (red) Off On Flashing at 1.4 Hz (slow) Flashing at 2.8 Hz (fast)	Group error No error Connected device has an internal error or is not present Process error or I/O error on a device PROFIBUS configuration and station structure do not match

5.6.5 Communication with PLC logic

5.6.5.1 Setting in the LOGIC+ software

The INTERFACE system IOs are required for communication with a gateway. They can be found in the “Data Items” tab in the toolbox in LOGIC+.

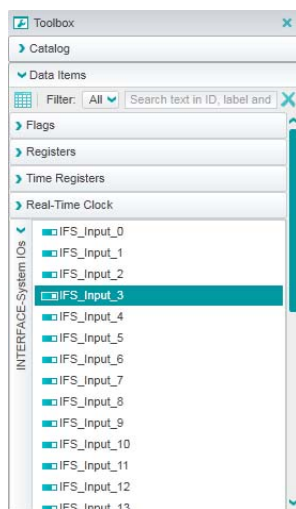


Figure 5-22 INTERFACE system IOs

These INTERFACE system IOs are used as 16-bit words. In order to read these 16-bit words as individual bits, the “IFSToFlags” and “FlagsToIFS” function blocks from the “INTERFACE System” library are required, which can be downloaded free of charge at phoenixcontact.net/products.

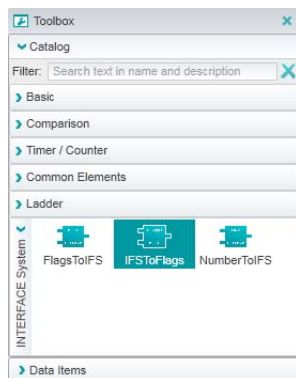


Figure 5-23 Function blocks

The “IFSToFlags” function block can be used to break down an input word from the IFS gateway into its 16 bits.

The “FlagsToIFS” block combines the 16 individual bits into a 16-bit word that can be read by the IFS gateway.

Since LOGIC+ uses double integers (DINT, 32 bits) and the gateway uses integers (INT, 16 bits), numerical values must be converted. This conversion can be performed using the “NumberToIFS” function block from the “INTERFACE System” library. This block outputs an error in the event of a value outside of the -32768 ... 32767 value range.

An example program is shown in the screenshot below where input “IFS_Input_0” is broken down into its 16 bits and provided directly at the hardware outputs of the logic module + an extension module.

Furthermore, the values of the logic module realtime clock are forwarded to the gateway as numerical values.

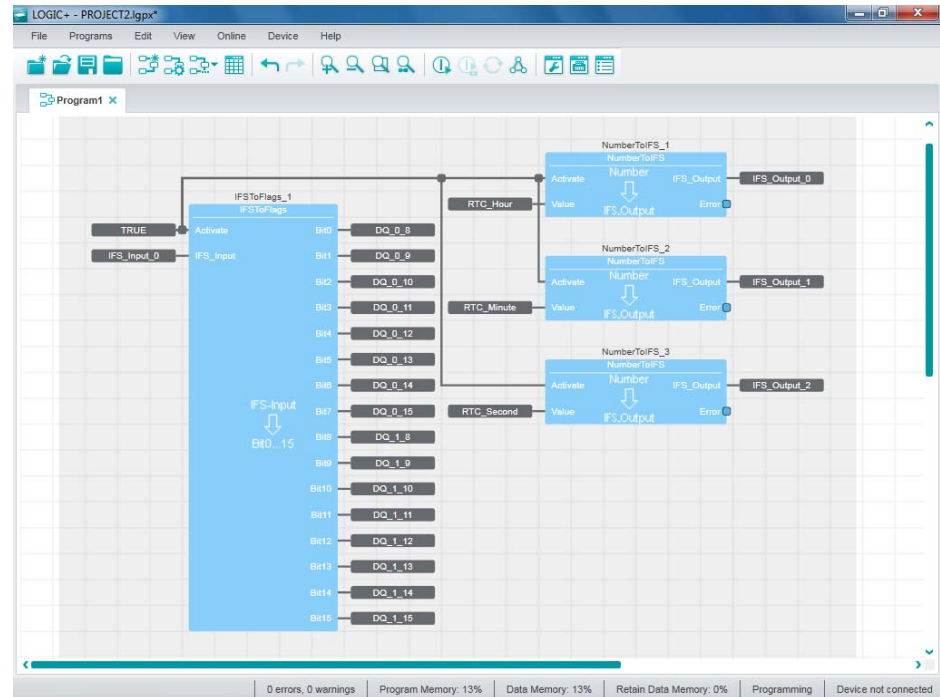


Figure 5-24 Example program

5.6.5.2 Settings on the gateway

The connection between the gateway and a PC is established using the IFS-USB-DATACABLE programming adapter (Order No. 2320500).

Insert the programming adapter into the S-PORT interface of the gateway. A USB connector plug is available on the PC side.

The IFS-CONF-SUITE-INTERFACE software is required in order to parameterize the gateway. It is available to download free of charge at phoenixcontact.net/products.

Install the following components:

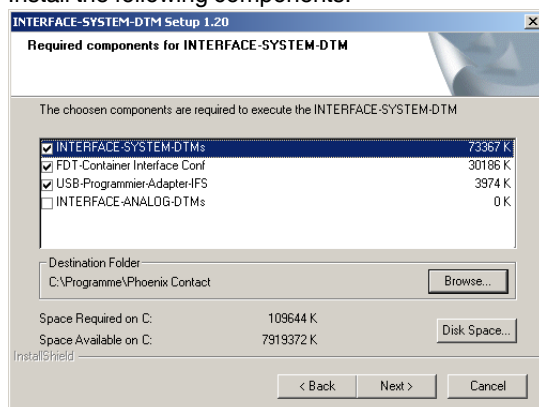


Figure 5-25 Installing components

Before parameterizing the required settings on the gateway, arrange the components as described in “Mounting” on page 71.

1. Connect the TBUS connection on the PLC-V8C logic module to the DIN rail connector using the appropriate PLC-V8C/CAB/TBUS/0,3M cable (Order No. 2905263).
2. Establish the connection between the gateway and a PC using the IFS-USB-DATACABLE programming adapter (Order No. 2320500).
3. Supply the gateway and the PLC logic module with the operating voltage (24 V DC, see technical data in the corresponding package slip).
4. Start the IFS-CONF program (FDT container) so that the gateway recognizes the INTERFACE system IOs used.
5. When IFS-CONF is started for the first time, you need to create a new user who is assigned the role of “Administrator”. A password does not have to be assigned. You can create additional user names with different roles. (For example maintenance personnel, operating personnel or observers can be assigned different rights).



The user name is requested every time IFS-CONF is started. Please keep a note of your user name.

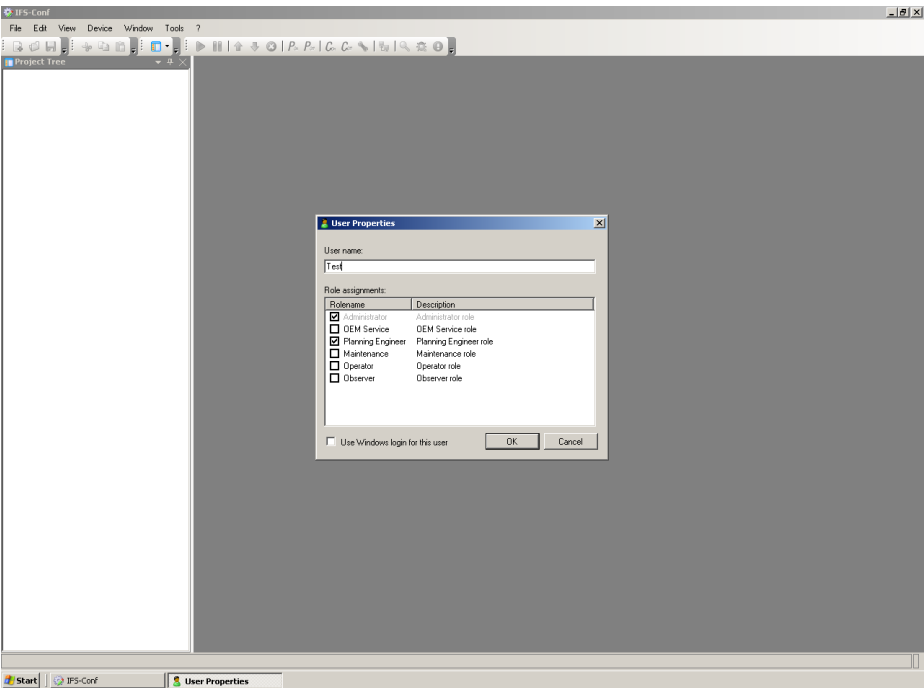


Figure 5-26 User Properties > creating a user

6. The installed device drivers for PLC logic are loaded in the next step.

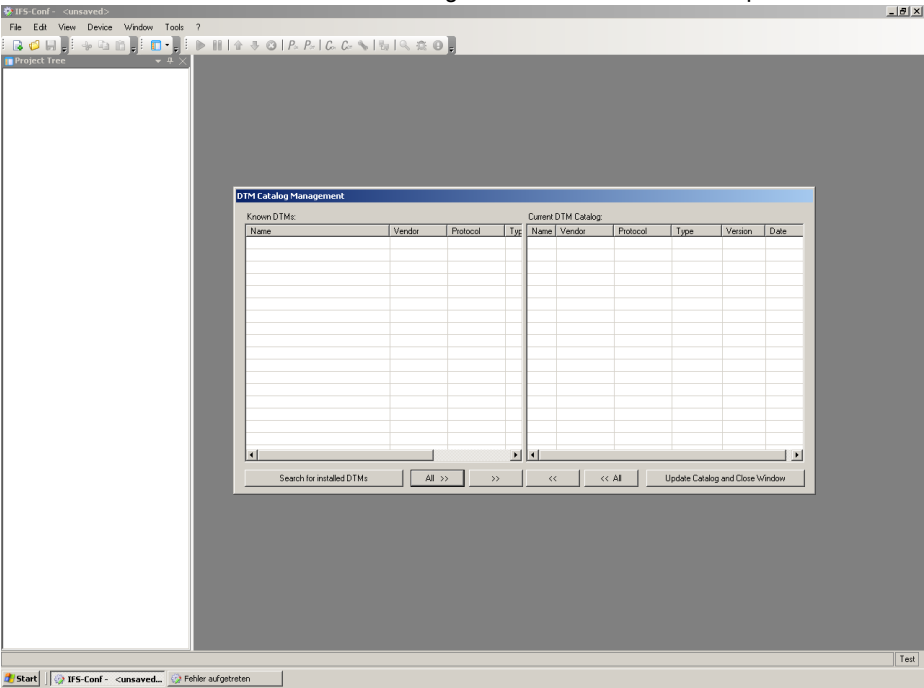


Figure 5-27 Loading device drivers

7. Click on “Search for installed DTMs”.

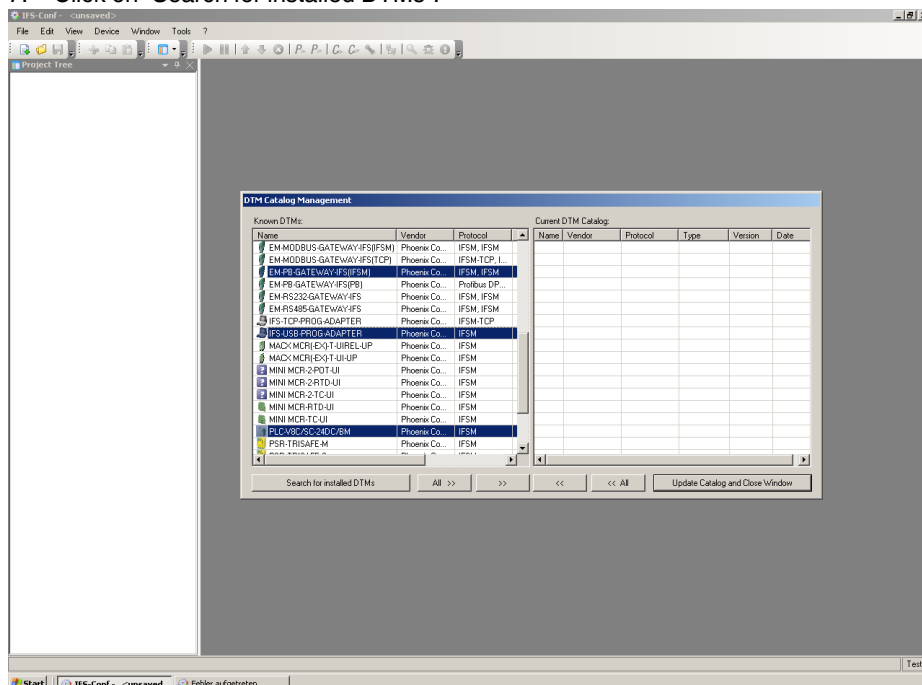


Figure 5-28 Display of installed DTMs

8. Select the EM-PB-GATEWAY-IFS(IFS) gateway, the IFS-USB-PROG-ADAPTER programming adapter, and the PLC-V8C logic module.
9. Add the selected devices to the current DTM catalog by clicking on the “>>” button.
10. Click on “Update Catalog and Close Window”.

The program performs an automatic topology scan and the hardware structure is read.

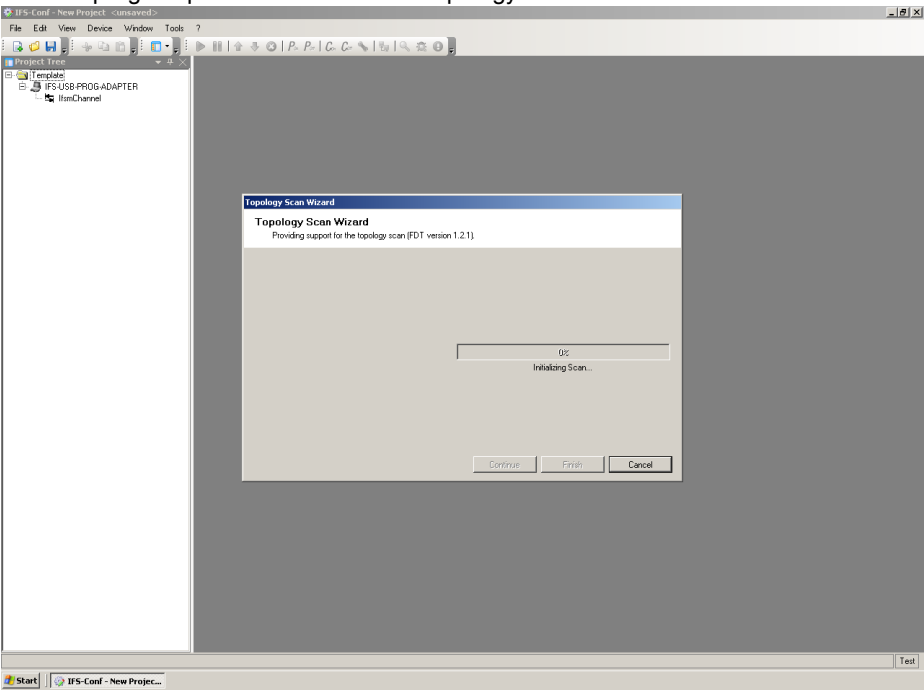


Figure 5-29 Topology scan

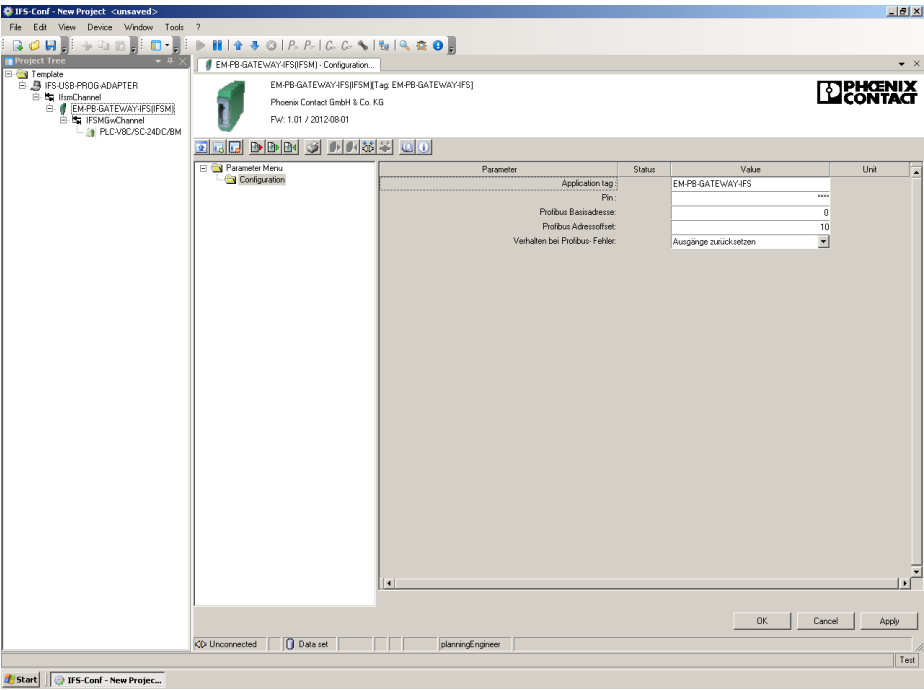


Figure 5-30 Hardware structure

11. Double-click on the EM-PB-GATEWAY-IFS (IFSM) in the project tree.
This opens the gateway settings window.
12. In the settings window, set the desired PROFIBUS address for the gateway under “PROFIBUS address offset”.
13. If you change the preset value, this information must be written to the gateway again.
To do this, click on “Apply”.
14. You then need to connect to the gateway by clicking on “Connect” and write the new address to the gateway by clicking on “Write to device”.
15. Right-click on the EM-PB-GATEWAY-IFS in the project tree and select “Functions > Process value configuration”.

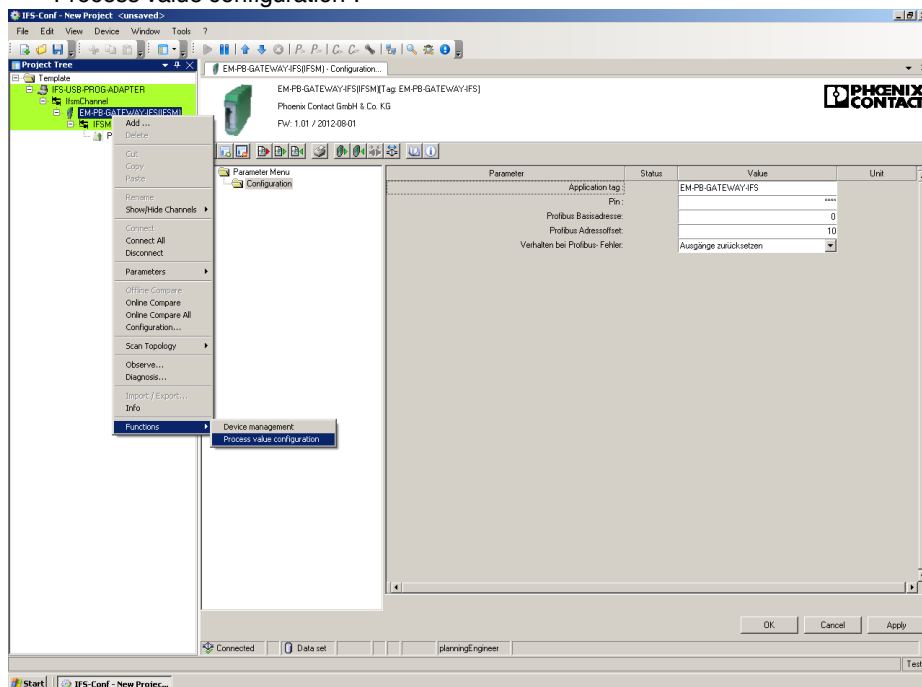


Figure 5-31 Opening the process data configuration

This is split into “Inputs” and “Outputs”.

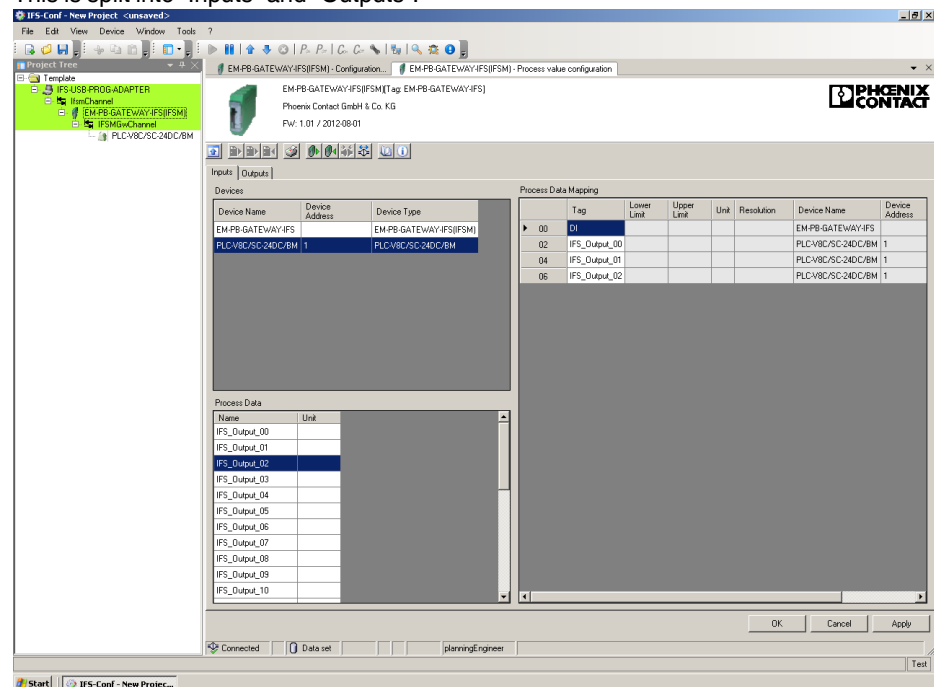


Figure 5-32 Process data configuration: Inputs - Outputs



Here, an output in LOGIC+ (e.g., IFS_Output_0) is an input for the gateway and can be found on the “Input” tab.

16. Select “PLC-V8C...BM” in the “Devices” area.
Process data that can be selected is visible in the “Process Data” window.
17. Move the required process data to the “Process Data Mapping” window by means of drag and drop.

For example, “IFS_Output_00”, “IFS_Output_01”, and “IFS_Output_02” from the example program (see Figure 5-24 on page 76) for LOGIC+.

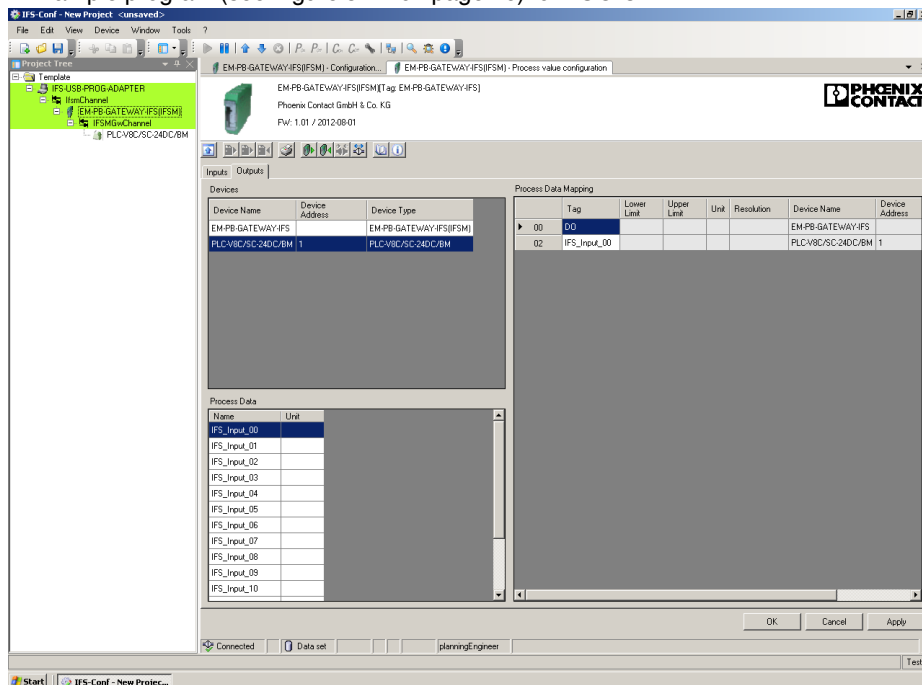


Figure 5-33 Process data configuration: example

18. Define the outputs in the process data assignment in the same way.
19. Apply the process data assignments by clicking on “Apply” in the active DTM project.
20. Click on the “Connect” button to establish a connection to the gateway.
21. Send the current configuration to the gateway by clicking on the “Write to device” button.

The values are now available in the gateway and can be requested from the gateway via a PROFIBUS DP master

5.6.5.3 Gateway communication with a PROFIBUS DP master

For additional settings, a connection must be established between the gateway and a PROFIBUS DP master (e.g., Siemens S7 controller) via a standard PROFIBUS cable.

A PROFIBUS interface is available on the gateway via a 9-pos. D-SUB connector (socket).



A Siemens S7-300 controller is shown in later screenshots.

A GSD file is required in order to integrate the gateway into the bus configuration. This is available to download at phoenixcontact.net/products.

After integrating the GSD in the STEP 7 catalog, the gateway can be found in the “PROFIBUS DP > Additional Field Devices > Gateway” area. The “EM-PB-GATEWAY-IFS” must now be inserted in the PROFIBUS bus configuration.

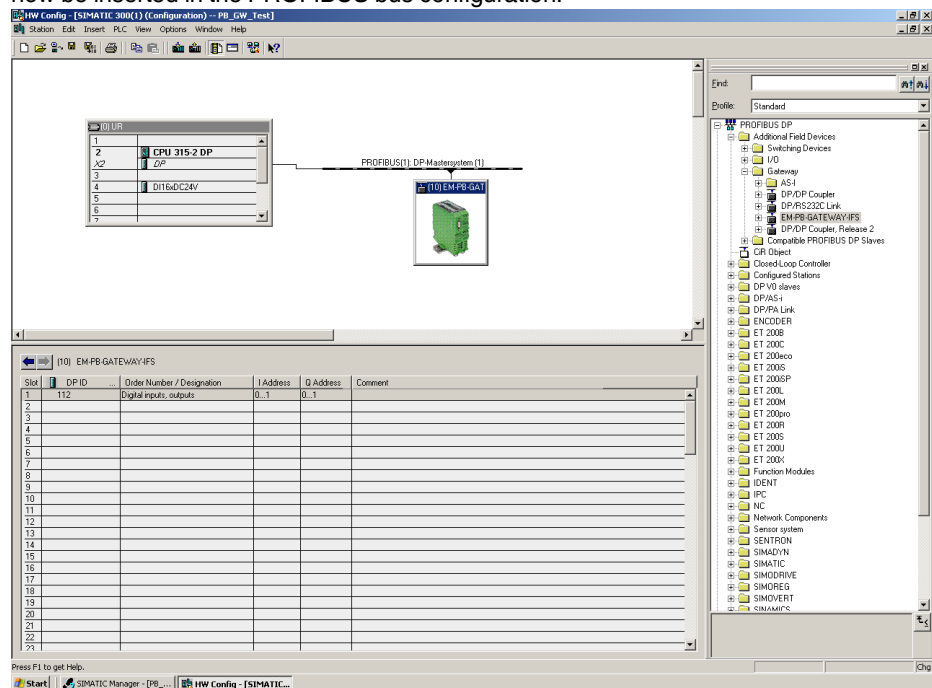


Figure 5-34 Inserting the gateway in the bus configuration

1. Open the properties window by double-clicking on the gateway in the bus configuration.
2. On the “Parameter Assignment” tab, set the “Configuration via DTM” entry to “Enabled” and the “Byte order” to “Intel”.

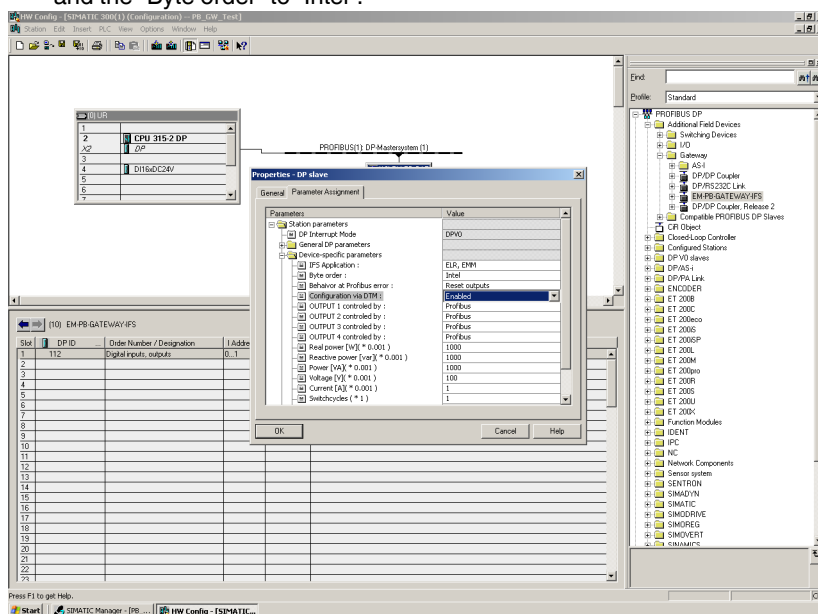


Figure 5-35 Setting the “Configuration via DTM” and “Byte order” entries

3. Open the EM-PB-GATEWAY-IFS in the catalog. The possible process words are listed.



“Byte order” sets the byte order of the transferred data.

- Motorola: Big Endian (the high byte is saved first)
- Intel: Little Endian (the low byte is saved first)

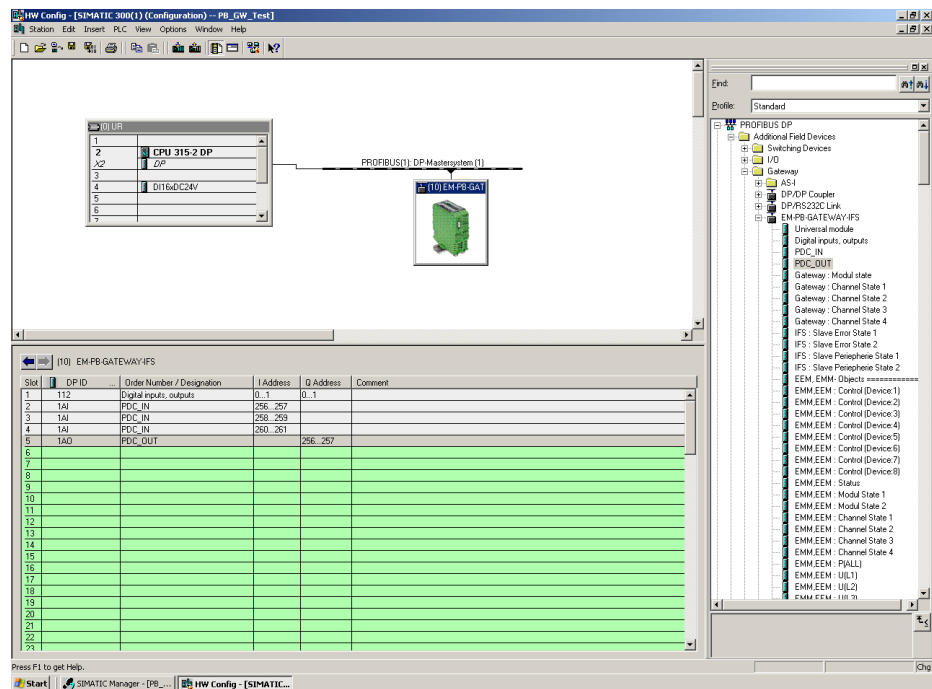


Figure 5-36 Listing process words

4. For PLC logic, use “PDC_IN” (input from DTM) and “PDC_OUT” (output from DTM) from the catalog.

Address	Tag	Lower Limit	Upper Limit	Unit	Resolution	Device Name
00	DI					EM-PB-GATEWAY-IFS
02	IFS_Output_00					PLC-V8C/SC-24DC/BM
04	IFS_Output_01					PLC-V8C/SC-24DC/BM
06	IFS_Output_02					PLC-V8C/SC-24DC/BM

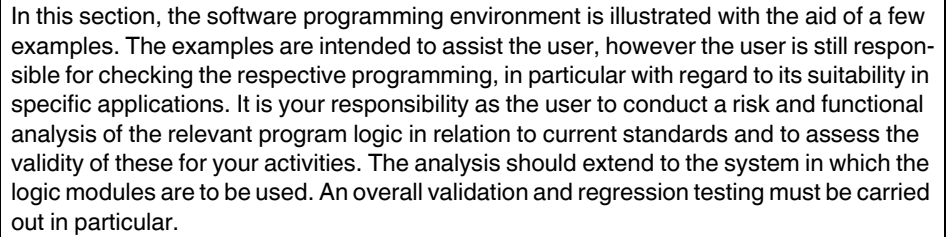
Address	Tag	Lower Limit	Upper Limit	Unit	Resolution	Device Name
00	D0					EM-PB-GATEWAY-IFS
02	IFS_Input_00					PLC-V8C/SC-24DC/BM

Slot	DP ID	Order Number / Designation	I Address	Q Address
1	112	Digital inputs, outputs	0...1	0...1
2	1AI	PDC_IN	256...257	
3	1AI	PDC_IN	258...259	
4	1AI	PDC_IN	260...261	
5	1AO	PDC_OUT		256...257

Figure 5-37 “PDC_IN” (input from DTM) and “PDC_OUT” (output from DTM)

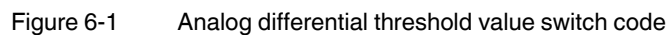
The order of the inputs and outputs must be the same as the process data assignment in the DTM.

Input and output addresses are assigned automatically by STEP7 when added. They can now be used in the program code.



Please observe the notes provided in the package slip for the logic module and in the software, especially any safety notes and installation instructions.

The output is switched on and off according to a parameterizable threshold and differential value.



6.2 Analog threshold value switch

The output is switched on and off according to two parameterizable threshold values (hysteresis).

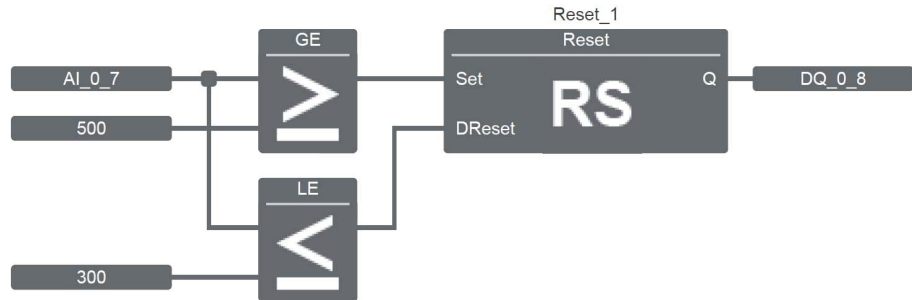


Figure 6-2 Analog threshold value switch code

6.3 Analog comparator

The output is switched on and off according to the difference between $A_x - A_y$ and two parameterizable threshold values.

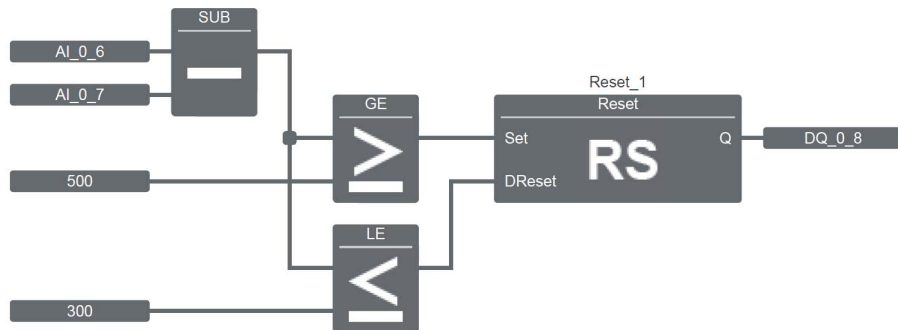


Figure 6-3 Analog comparator code

6.4 Pulse relay

The output is switched on or off by an input pulse.

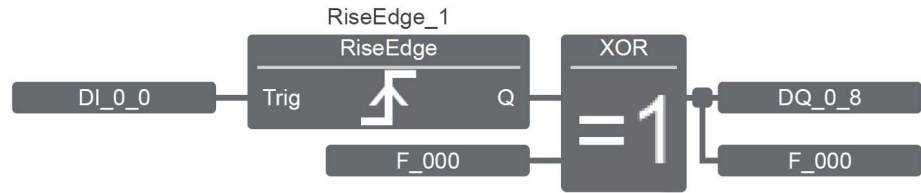


Figure 6-4 Pulse relay code

6.5 Interval time-delay relay with pulse output

An input signal switches the output to the TRUE state. The output is reset after a parameterizable time or after the input changes from FALSE to TRUE.

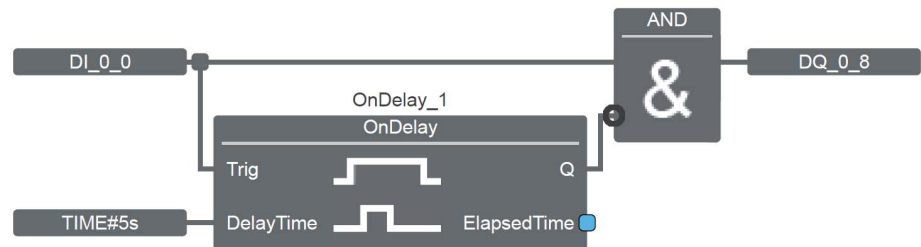


Figure 6-5 Interval time-delay relay with pulse output code

6.6 Edge-triggered interval time-delay relay

An input pulse generates a number of signals at the output after an adjustable time (can be retriggered).

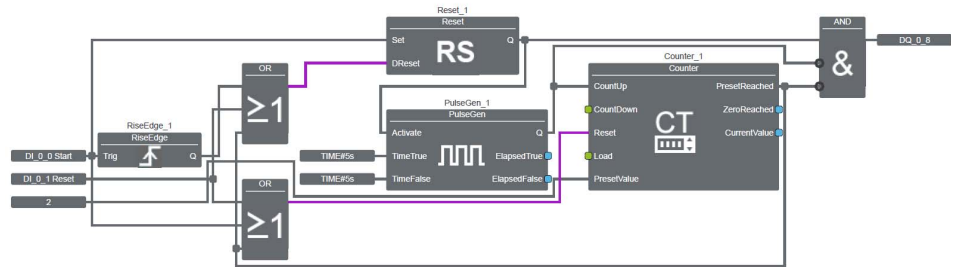


Figure 6-6 Edge-triggered interval time-delay relay

7 Application examples



In this section, the software programming environment is illustrated with the aid of a few examples. The examples are intended to assist the user, however the user is still responsible for checking the respective programming, in particular with regard to its suitability in specific applications. It is your responsibility as the user to conduct a risk and functional analysis of the relevant program logic in relation to current standards and to assess the validity of these for your activities. The analysis should extend to the system in which the logic modules are to be used. An overall validation and regression testing must be carried out in particular.

The program examples are solely for explanation purposes and do not claim to be complete. They must therefore not be generalized or used without being checked.

Please observe the notes provided in the package slip for the logic module and in the software, especially any safety notes and installation instructions.

7.1 Underground parking garage ventilation

Fans in an underground parking garage are to be controlled with PLC logic.

The carbon monoxide concentration in an underground parking garage is detected using a CO sensor and made available to PLC logic as a 0 V 10 V standard signal via an analog signal conditioner. PLC logic acquires the standard signal at analog input IN6. In this example, there are three fans available in the underground parking garage. At a CO concentration > 30 ppm, fan 1 (DQ_0_11) starts up, at > 60 ppm fans 1 and 2 (DQ_0_12) run and the yellow light (DQ_0_8) indicates a warning. At a concentration > 90 ppm, all three fans (DQ_0_13) run, the red warning light (DQ_0_9) and the horn (DQ_0_10) indicate danger.

The CO sensor and signal conditioner convert the 0 ppm ... 300 ppm measuring range into 0 V ... 10 V. The LOGIC+ software processes the standard signal as values from 0 ... 1000, therefore 30 ppm corresponds to a value of 100 in LOGIC+, 60 ppm corresponds to 200, and 90 ppm corresponds to 300.

All three fans can be switched on and off manually via button 1 (IN0) and button 0 (IN1).

7.1.1 Hardware structure

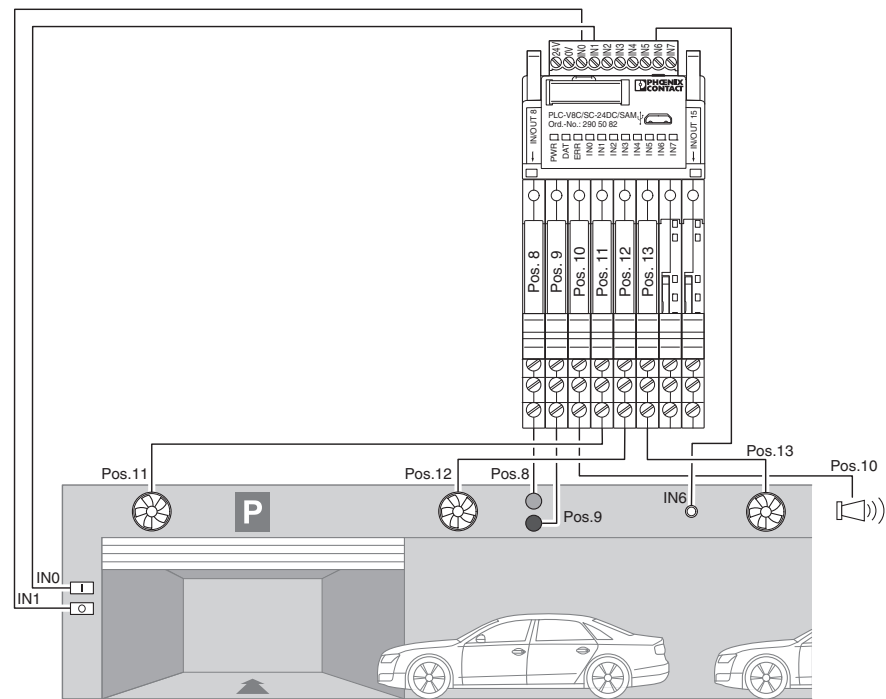


Figure 7-1 Structure for underground parking garage ventilation

Number	Description	Order designation	Order No.
1	Stand-alone module	PLC-V8C/SC-24DC/SAM	2905082
6	Relay module	PLC-RSC-24DC/1/ACT	2966171
2	Empty socket	PLC-BSC-24DC/21	2966016

7.1.2 LOGIC+ program

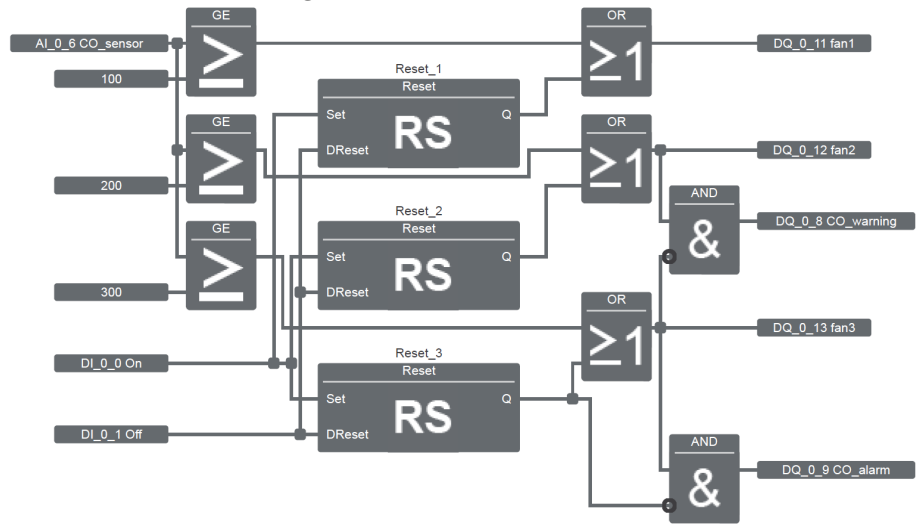


Figure 7-2 Underground parking garage ventilation code

7.1.3 Inputs and outputs used

Table 7-1 Inputs

Item	ID	Label	Description
IN0	DI_0_0	On	Manual activation of all fans
IN1	DI_0_1	Off	Switches manual activation off again
IN6	AI_0_6	CO_sensor	CO sensor

Table 7-2 Outputs

Item	ID	Label	Description
8	DQ_0_8	CO_warning	Control of warning light
9	DQ_0_9	CO_alarm	Control of alarm light
10	DQ_0_10	alarm_horn	Control of horn
11	DQ_0_11	fan1	Control of fan 1
12	DQ_0_12	fan2	Control of fan 2
13	DQ_0_13	fan3	Control of fan 3

7.2 Sliding door system

A sliding door system is to be controlled with PLC logic.

In this application example, an electrically powered sliding door system is to be controlled with PLC logic. The door is to be actuated by two buttons in the building, button T1 (Open) and button T2 (Close), induction loops in the floor (loop) on exit or a key switch at the door.

The door system is to be opened and closed as per the functional sequence below.

Opening and closing the door via buttons T1 and T2 in the building

When button T1 is actuated, the door opens and moves to the end position which is sensed via a limit switch. If button T1 or T2 is actuated while the door is being opened, the operation is stopped. The door can now be opened by actuating button T1 or closed by actuating button T2 (limit switch).

Opening the door by means of the induction loop

When the induction loop gives a signal, the door opens to the end position, regardless of whether the door is completely closed or partially open. If button T1 or T2 is actuated while the door is being opened, the operation is stopped. The door can now be opened by actuating button T1 or closed by actuating button T2. The induction loop only responds again if the door has been completely closed or opened by actuating the button or the key switch. If the door opens or closes by actuating the button or the key switch, the function of the induction loop is blocked.

Opening and closing the door via the key switch at the door

The key switch has three positions: Open, Automatic, Close. If the key switch is set to the "Open" position, the door opens and moves to the end position which is sensed via a limit switch. If the key switch is set to the "Automatic" position while the door is being opened, the operation is stopped. The door can now be opened or closed by setting the key switch to the "Open" or "Close" position. The key switch only responds if it remains in the relevant position for at least seconds. The key switch has priority over the induction loop and the buttons in the building. When the key switch is permanently set to the "Close" position, the door cannot be opened, likewise when the door is set to the "Open" position the door cannot be closed. The induction loop and the button only respond when the key switch is in the "Automatic" position.

Safety rail

The door is monitored by a safety rail when it is being closed. If the safety rail has detected a fault, the operation is stopped or cannot be started. The button in the building only responds if no fault is indicated by the safety rail. The key switch must first be returned to the "Automatic" position after a fault.

An optical signal light warns when the sliding door system is being opened and closed and makes people in the vicinity aware of the operation.

7.2.1 Hardware structure

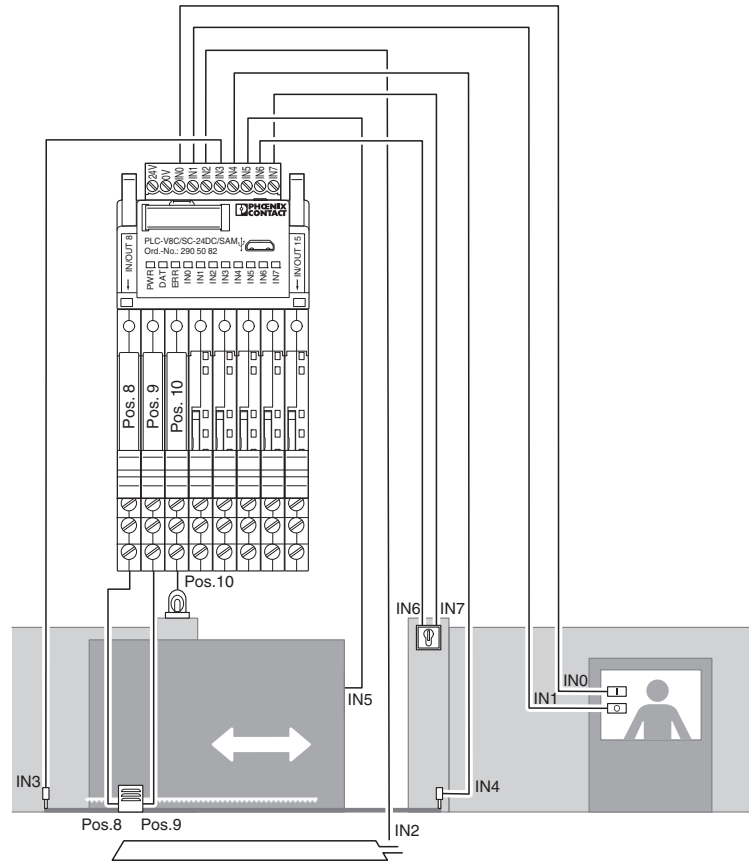


Figure 7-3 Structure for sliding door system

Number	Description	Order designation	Order No.
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
3	Relay module	PLC-RSC-24DC/1/ACT	2966171
5	Empty socket	PLC-BSC-24DC/21	2966016

7.2.2 LOGIC+ program

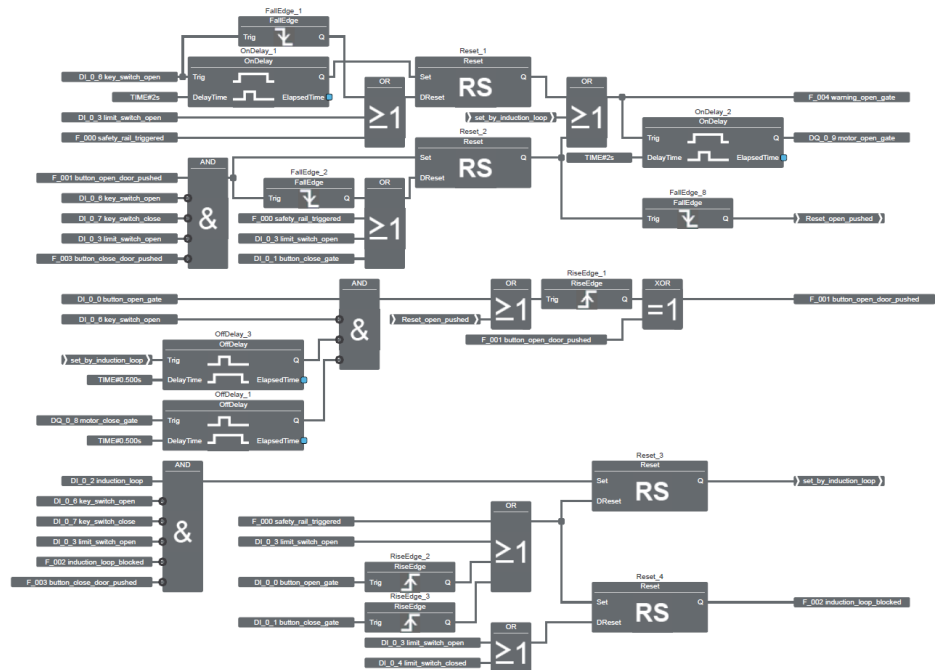


Figure 7-4 Sliding door system open_gate code

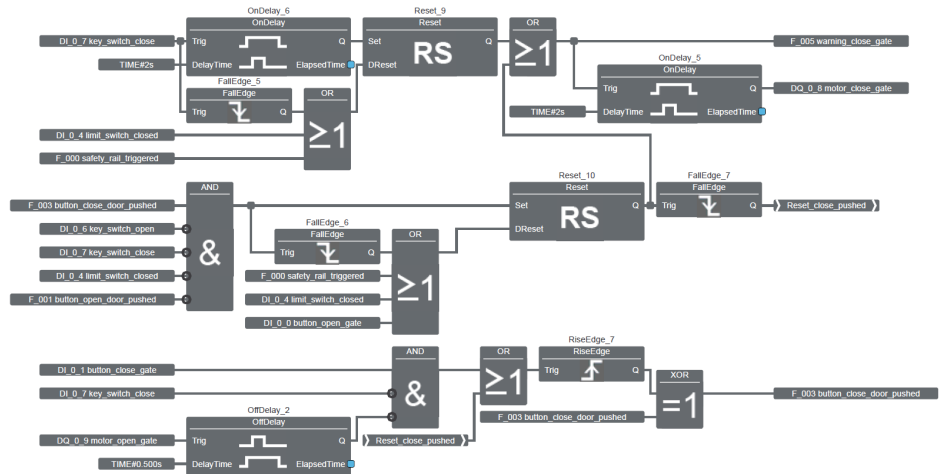


Figure 7-5 Sliding door system close_gate code

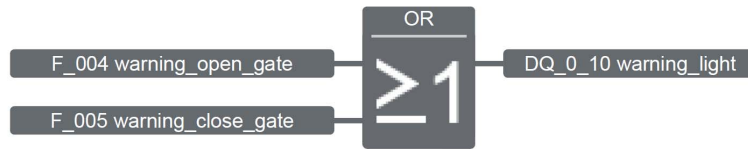


Figure 7-6 Sliding door system warning_light code

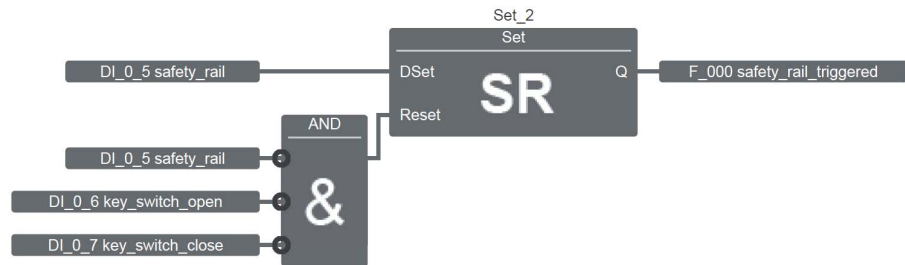


Figure 7-7 Sliding door system safety_rail code

7.2.3 Inputs and outputs used

Table 7-3 Inputs

Item	ID	Label	Description
IN0	DI_0_0	button_open_gate	Button T1 (open door)
IN1	DI_0_1	button_close_gate	Button T2 (close door)
IN2	DI_0_2	induction_loop	Induction loop
IN3	DI_0_3	limit_switch_open	Limit switch: door closed
IN4	DI_0_4	limit_switch_closed	Limit switch: door open
IN5	DI_0_5	safety_rail	Safety rail
IN6	DI_0_6	key_switch_open	Key switch in "Open" position
IN7	DI_0_7	key_switch_close	Key switch in "Close" position

Table 7-4 Outputs

Item	ID	Label	Description
8	DQ_0_8	motor_close_gate	Motor control to open door
9	DQ_0_9	motor_open_gate	Motor control to close door
10	DQ_0_10	warning_light	Orange warning light

Table 7-5 Flags

ID	Label	Description
F_000	safety_rail_triggered	The safety rail has been triggered
F_001	button_open_door_pushed	Button T1 "Open door" has been pushed
F_002	induction_loop_blocked	Flag to block the induction loop
F_003	button_close_door_pushed	Button T2 "Close door" has been pushed
F_004	warning_open_gate	Warning flag for "Door opening"
F_005	warning_close_gate	Warning flag for "Door closing"

7.3 Temperature monitoring with adjustable switching hysteresis

A medium is to be kept within a temperature range with PLC logic.

Switching hystereses are already used for temperature monitoring in many applications, e.g., on heating coils or when switching on fans. In this example, a heated medium is kept within a temperature range of 40°C ... 80°C. The current temperature is detected via a Pt 100 sensor and is converted to a 0 V ... 10 V standard signal via a temperature transducer. PLC logic reads this value at input AI_0_6. If the value is less than or equal to 40°C, the heating coil is switched on via output DQ_0_8. As soon as a temperature of 80°C is reached, the heating coil is switched off and is not switched on again until the temperature of the medium has dropped to 40°C.

The temperature transducer is configured to a measuring range span of 0°C ... 200°C (corresponds to 0 V ... 10 V). LOGIC+ converts the standard voltage into values from 0 ... 1000. 40°C therefore corresponds to a setpoint of 200 and 80°C to a setpoint of 400. The specifications are selected in LOGIC+ accordingly.

In this example, PLC logic monitors two heating vessels. PLC logic reads the temperature of the second medium at input AI_0_7 and switches the heating coil via output DQ_0_9.

7.3.1 Hardware structure

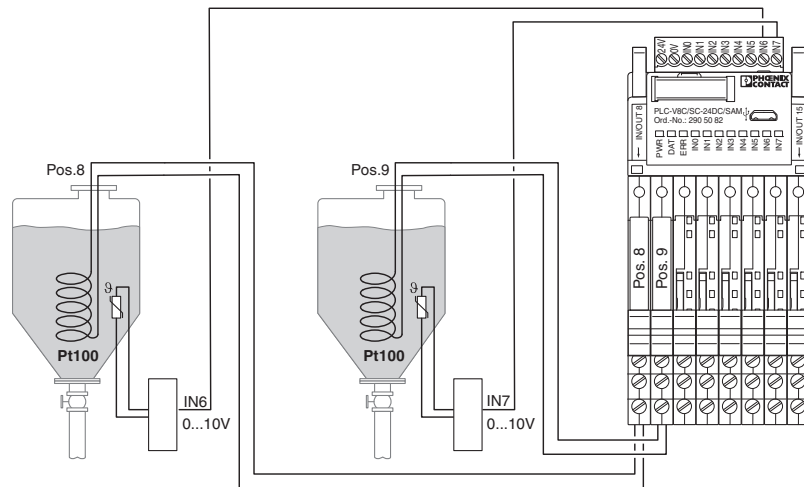


Figure 7-8 Structure for temperature monitoring with adjustable switching hysteresis

Number	Description	Order designation	Order No.
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
2	Relay module	PLC-RSC-24DC/21	2966171
6	Empty socket	PLC-BSC-24DC/21	2966016

7.3.2 LOGIC+ program

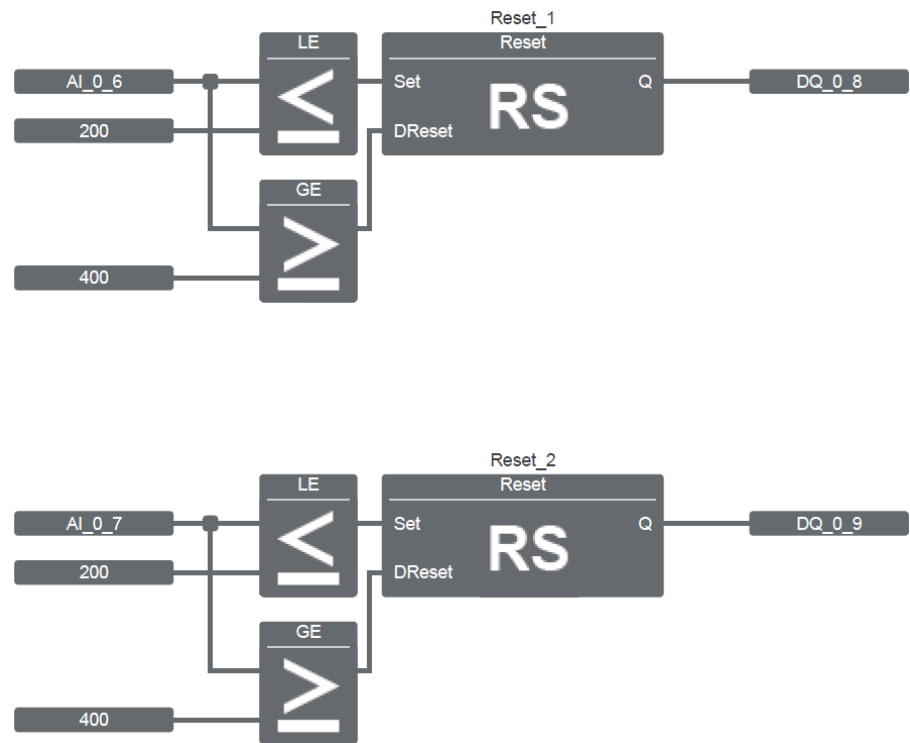


Figure 7-9 Temperature monitoring with adjustable switching hysteresis code

7.3.3 Inputs and outputs used

Table 7-6 Inputs

Item	ID	Label	Description
IN6	AI_0_6	-	Analog input for temperature measurement in medium 1
IN7	AI_0_7	-	Analog input for temperature measurement in medium 2

Table 7-7 Outputs

Item	ID	Label	Description
8	DQ_0_8	-	Output to switch on the heating coil in medium 1
9	DQ_0_9	-	Output to switch on the heating coil in medium 2

7.4 Conveyor belt system

A conveyor belt system with three belts is to be controlled with PLC logic. The conveyor belts should not be overloaded as a result of incorrect startup.

The system is switched on and off via two buttons (IN0, IN1). The conveyor belts only start up if a container is detected behind the last conveyor belt (limit switch at IN2).

The conveyor belts start up in the following order: first the last conveyor belt (Motor3, DQ_10), then in 5 s intervals the second conveyor belt (Motor2, DQ_09) and then the first conveyor belt (Motor1, DQ_08). This ensures that a conveyor belt is not overloaded. When the Off button is actuated, the same procedure is performed in reverse order. First conveyor belt 1 stops, followed by conveyor belt 2 and then conveyor belt 3.

7.4.1 Hardware structure

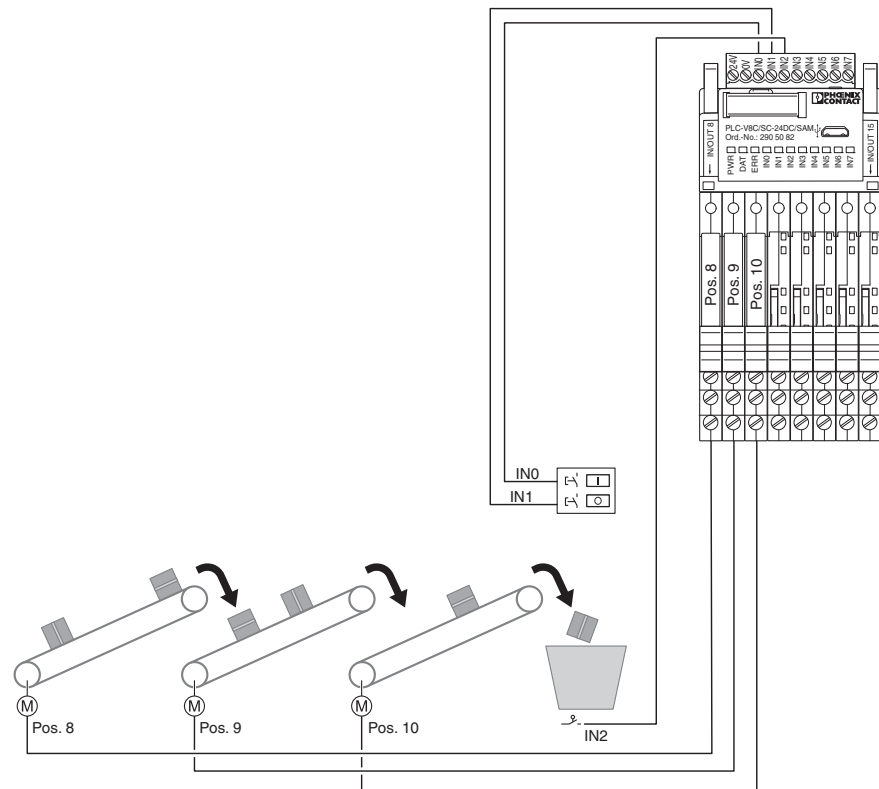
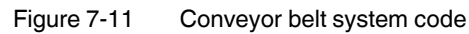


Figure 7-10 Structure for conveyor belt system

Number	Description	Order designation	Order No.
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
3	Relay module	PLC-RSC-24DC/1/ACT	2966171
5	Empty socket	PLC-BSC-24DC/21	2966016

105868_en_00



7.4.3 Inputs and outputs used

Table 7-8 Inputs

Item	ID	Label	Description
IN0	DI_0_0	On	Switches the conveyor belt system on
IN1	DI_0_1	Off	Switches the conveyor belt system off
IN2	DI_0_2	sensor_container	Sensor for detecting the container

Table 7-9 Outputs

Item	ID	Label	Description
8	DQ_0_8	conveyor1	Motor control for conveyor belt 1
9	DQ_0_9	conveyor2	Motor control for conveyor belt 2
10	DQ_0_10	conveyor3	Motor control for conveyor belt 3

A Technical data

Criterion	Value
Supply	
Supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 26.4 V DC
Maximum input current at U_N PLC-V8C/...-24DC/SAM PLC-V8C/...-24DC/BM PLC-V8C/...-24DC/EM	120 mA 120 mA 65 mA
Input data	Digital inputs
Number of inputs	8 (2 configurable as analog)
Description of the input	EN 61131-2 type 3
Input voltage	24 V DC
Input current "0" signal	< 1 mA
Input current "1" signal	2.5 mA, typical
Delay time	3 ms, maximum (basic module, stand-alone module) 50 ms, maximum (extension module)
Switching frequency	200 Hz, maximum (basic module, stand-alone module) 20 Hz, maximum (extension module)
Input data	Analog inputs
Number of inputs	2 (IN6 and IN7 are configurable as analog)
Input voltage range	0 V ... 10 V
Input resistance	> 3.5 k Ω
Measured value deviation	$\pm 3\%$, 0.15 V, minimum
Delay time	10 ms, maximum (basic module, stand-alone module) 50 ms, maximum (extension module)
Input data	Contacts for PLC-INTERFACE
Number of inputs	≤ 8
Description of the input	Technical data depends on the PLC used
Output data	
Number of outputs	≤ 8
Nominal output voltage	24 V DC
Nominal current	9 mA
Switching frequency	10 Hz, maximum (basic module, stand-alone module) 10 Hz, maximum (extension module)
Realtime clock	
Realtime clock accuracy	± 2 s/d
Buffer time	24 h (capacitor)
General data	
Ambient temperature rangeOperation	-20°C ... +45°C
Ambient temperature rangeStorage/transport	-20°C ... +70°C
Humidity according to DIN EN 61131-2	10% ... 95%

Criterion	Value
Air pressure	86 kPa ... 106 kPa (2000 m, maximum)
Sinusoidal vibrations according to IEC 60068-2-6	2g load, 2.5 hours in each space direction
Shock according to IEC 60068-2-27	15g load for 11 ms, three shocks in each space direction
Startup time when supply voltage on	< 6 s
Maximum supply voltage interruption	< 4.5 ms
Assembly instructions	Can be plugged onto 8 x PLC-INTERFACE
Degree of protection	IP20
COMBICON connection Screw connection Solid / stranded / AWG	0.14 ... 1.5 mm ² / 0.14 ... 1.5 mm ² / 28 - 16
COMBICON connection Push-in connection Solid / stranded / AWG	0.14 ... 1.5 mm ² / 0.14 ... 1.5 mm ² / 26 - 16
Air and creepage distances between the circuits	DIN EN 50178
Rated insulation voltage	50 V
Rated surge voltage	0.8 kV
Insulation	Basic insulation
Conformance	CE-compliant

Table A-1 Electromagnetic compatibility (EMC)

Criterion	Test according to	Value
Noise emission	EN 55016-2-3	-
Electrostatic discharge	EN 61000-4-2	6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3	10 V/m
Conducted high frequency	EN 61000-4-6	10 V
Burst	EN 61000-4-4	2 kV supply and signal cables
Surge	EN 61000-4-5	0.5 kV symmetrical to supply cables 1 kV asymmetrical to supply cables 1 kV asymmetrical to signal cables

B Appendix for document lists

B 1 List of figures

Section 1

Figure 1-1:	Entire system	10
-------------	---------------------	----

Section 2

Figure 2-1:	Configuration with 10 inputs, 6 outputs	16
Figure 2-2:	Configuration with 8 inputs, 8 outputs	17
Figure 2-3:	Configuration with 20 inputs, 12 outputs	18

Section 3

Figure 3-1:	Connection and operating elements of stand-alone logic modules	20
Figure 3-2:	Connection and operating elements of basic logic modules	21
Figure 3-3:	Connection and operating elements of extension logic modules	22
Figure 3-4:	Connection and operating elements of PLC-INTERFACE terminal blocks	23
Figure 3-5:	Basic circuit diagram for PLC-V8C/.../SAM	26
Figure 3-6:	Basic circuit diagram for PLC-V8C/.../BM	26
Figure 3-7:	Basic circuit diagram for PLC-V8C/.../EM	27
Figure 3-8:	Snapping the PLC-INTERFACE terminal blocks onto the DIN rail	28
Figure 3-9:	Snapping the logic module onto the PLC-INTERFACE terminal blocks	29
Figure 3-10:	Logic module is fixed in place	29
Figure 3-11:	Actuating the eject levers to remove the logic modules	31

Section 4

Figure 4-1:	Power supply	33
Figure 4-2:	Integrated inputs	34
Figure 4-3:	Connecting integrated inputs	34
Figure 4-4:	PLC modules with screw connection	37
Figure 4-5:	PLC modules with push-in connection	38
Figure 4-6:	Wiring of inputs via PLC-INTERFACE terminal blocks	39
Figure 4-7:	Pin assignment of inputs via PLC-INTERFACE terminal blocks	39

Figure 4-8:	Convenient connection of the sensor series	40
Figure 4-9:	Wiring of outputs via PLC-INTERFACE terminal blocks	41
Figure 4-10:	Pin assignment of outputs via PLC-INTERFACE terminal blocks	42
Figure 4-11:	Convenient connection of the actuator series	43
Figure 4-12:	PLC logic and PC connection	44

Section 5

Figure 5-1:	Overview	46
Figure 5-2:	Current Values	47
Figure 5-3:	Login	48
Figure 5-4:	General configuration settings	49
Figure 5-5:	Setting the IP address	50
Figure 5-6:	Setting the password	51
Figure 5-7:	Starting firmware update	52
Figure 5-8:	Firmware update - file selection	53
Figure 5-9:	Firmware update - progress indicator	54
Figure 5-10:	Firmware update - emptying the cache	55
Figure 5-11:	Overview of device information	56
Figure 5-12:	LOGIC+ start page	58
Figure 5-13:	LOGIC+ interface	59
Figure 5-14:	Hardware configuration	62
Figure 5-15:	Communication Settings	65
Figure 5-16:	Determining the cycle time	68
Figure 5-17:	Inserting the IFS-CONFSTICK	69
Figure 5-18:	Mounting the PROFIBUS gateway and PLC logic	71
Figure 5-19:	EM-PB-GATEWAY-IFS	72
Figure 5-20:	Block diagram	73
Figure 5-21:	Status LEDs	73
Figure 5-22:	INTERFACE system IOs	75
Figure 5-23:	Function blocks	75
Figure 5-24:	Example program	76
Figure 5-25:	Installing components	77
Figure 5-26:	User Properties > creating a user	78
Figure 5-27:	Loading device drivers	78
Figure 5-28:	Display of installed DTMs	79
Figure 5-29:	Topology scan	80
Figure 5-30:	Hardware structure	80

Figure 5-31:	Opening the process data configuration	81
Figure 5-32:	Process data configuration: Inputs - Outputs	82
Figure 5-33:	Process data configuration: example	83
Figure 5-34:	Inserting the gateway in the bus configuration	84
Figure 5-35:	Setting the "Configuration via DTM" and "Byte order" entries	85
Figure 5-36:	Listing process words	86
Figure 5-37:	"PDC_IN" (input from DTM) and "PDC_OUT" (output from DTM)	86

Section 6

Figure 6-1:	Analog differential threshold value switch code	87
Figure 6-2:	Analog threshold value switch code	88
Figure 6-3:	Analog comparator code	88
Figure 6-4:	Pulse relay code	89
Figure 6-5:	Interval time-delay relay with pulse output code	89
Figure 6-6:	Edge-triggered interval time-delay relay	90

Section 7

Figure 7-1:	Structure for underground parking garage ventilation	92
Figure 7-2:	Underground parking garage ventilation code	93
Figure 7-3:	Structure for sliding door system	95
Figure 7-4:	Sliding door system open_gate code	96
Figure 7-5:	Sliding door system close_gate code	96
Figure 7-6:	Sliding door system warning_light code	97
Figure 7-7:	Sliding door system safety_rail code	97
Figure 7-8:	Structure for temperature monitoring with adjustable switching hysteresis	99
Figure 7-9:	Temperature monitoring with adjustable switching hysteresis code ..	100
Figure 7-10:	Structure for conveyor belt system	101
Figure 7-11:	Conveyor belt system code	102

B 2 List of tables

Section 1

Table 1-1:	Frequently used information	9
Table 1-2:	Possible applications	11

Section 2

Table 2-1:	Corresponding PLC-INTERFACE terminal blocks	14
------------	---	----

Section 3

Table 3-1:	Diagnostics and status indicators	24
Table 3-2:	Explanation of symbols	25

Section 4

Table 4-1:	Connection data for the 10-pos. COMBICON connector	33
Table 4-2:	Properties of the integrated inputs	34
Table 4-3:	Stand-alone logic module and basic logic module (station 0)	35
Table 4-4:	First extension logic module (station 1)	35
Table 4-5:	Second extension logic module (station 2)	35
Table 4-6:	Recommended jumpers	36
Table 4-7:	Stand-alone logic module and basic logic module (station 0)	36
Table 4-8:	First extension logic module (station 1)	37
Table 4-9:	Second extension logic module (station 2)	37

Section 5

Table 5-1:	Windows XP Service Pack 3	57
Table 5-2:	Windows Vista Service Pack 1	57
Table 5-3:	Windows 7	57
Table 5-4:	Windows 8	58
Table 5-5:	Areas of the LOGIC+ interface	59
Table 5-6:	Buttons in the toolbar	60
Table 5-7:	Available function blocks	63
Table 5-8:	Data item types	64
Table 5-9:	Components for integration in PROFIBUS DP	70

Section 7

Table 7-1:	Inputs.....	93
Table 7-2:	Outputs.....	93
Table 7-3:	Inputs.....	97
Table 7-4:	Outputs.....	97
Table 7-5:	Flags.....	98
Table 7-6:	Inputs.....	100
Table 7-7:	Outputs.....	100
Table 7-8:	Inputs.....	102
Table 7-9:	Outputs.....	102

Appendix A

Table A-1:	Electromagnetic compatibility (EMC).....	104
------------	--	-----